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ABSTRACT

To develop an assessment device for the evaluation of body image, to evaluate the body image of blind children, to make comparisons between subgroups (sex, age, IQ) and to derive sequences of tasks related to body image training, 91 children (mean age 10.06 years, mean IQ 88.32) were evaluated by a body image survey form. Analysis of the data indicated that a score combining the subscores from the body-part and laterality sections was predictive of the total battery score (r equals .92); no significant sex differences were obtained, but those with IQ's above 80, the totally blind, and children above 13 years scored generally superior to lower IQ, younger, and partially sighted children; the IQ and total test battery score were related (.40); and the total population was incapable of projection into the tester's reference system. Conclusions were that body image may be reliably assessed and that there were significant intragroup differences which have educational implications. Implications of the findings, a bibliography, and tables of results are included. (Author/JM)

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1 INTRODUCTION AND PURPOSE

Within the first few days of life, sighted infants begin looking at both moving and stable objects (23, 36). A week or two later they discover their hands and feet, and after watching them for a period of time, they somehow learn that these strange configurations can be brought under their conscious control, can contact objects, and can be moved from place to place (82). The construction of the body-image continues as infants watch their movements in mirrors and observe their playmates' limbs and movements.

By the age of two the normal child can verbally identify some of his parts, and by six or seven he can accurately make various left-right discriminations about his body. By eight and nine he can identify another person's left and right hands and can name most observable parts of his own body.

The blind child, on the other hand, must depend upon less exact information as he attempts to perceive his body and its movements and relationships to objects in his environment. Educators of the blind note that blind infants seem to have a vague idea about what is part of their bodies and what is not. In other ways, it has been observed, blind children have difficulty perceiving their bodies.

Many professional workers interested in the education of blind children, as well as individuals working with children neurologically impaired in other ways, have begun to pay attention to teaching body-image. Some special educators feel that it is important for the atypical child to perceive at least the gross aspects of his body before he is expected to make more complex judgments inherent in classroom tasks.

There is a marked relationship between movement attributes and body perceptions. In a recent study of retardates carried out by the senior author, a high correlation was found between a body-image score and scores elicited from a comprehensive battery of perceptual-motor tests. The body-image score was more predictive of the total battery score than any component of the evaluation instruments used (18). Unless a child can identify his body parts, it seems unlikely that he can move them very effectively.

Researchers have employed many methods to measure body perception. Some have utilized the psychiatrist's projective tools (12, 18); others have employed the clinical psychologist's assessment devices (1, 8); still others have used more exact tools to obtain scores dependent upon the child's ability to identify verbally various body parts (7, 18).

Classical child-development theory suggests that before a normal child can work effectively with visual space, he must derive a sound base from which to make these kinds of distal judgments—that is, form a "firm" body-image. This simplistic theory must be carefully dissected and evaluated. Still, it seems evident that to help a blind child grasp some of the simpler concepts of his spatial world, one must first help him find out about the space nearest him and, indeed, to find out about himself.

Two years ago, with this premise in mind, the senior author devised a 16-step body-image training sequence for sighted children (16). As subsequently modified, this sequence can be used to evaluate the extent to which a blind child can identify his body parts, the left-right dimensions of his body and its parts, and his body planes (side, back, front, and so forth), react correctly to requests for various bodily movements, and ascertain the movements of a person who is touching him. It also evaluates the accuracy with which the blind child can make various left-right judgments about his body and its parts and can differentiate between another person's left and right body parts. The extent to which the child can accurately judge the location of objects relative to his body and the manner in which he can accurately place his body relative to objects is also measured by the instrument.

It was hoped that this comprehensive assessment device could be used to accumulate data which might guide efforts to establish logical sequences of tasks for the blind child.

The sequencing of items in the evaluative instrument implies that the body-image is formed in its entirety only after the child has mastered simpler perceptions involving body-to-object relationships. Hence, the child is asked to "place the box nearest your front" and the like before he is asked to identify his left and right sides and hands.

Ninety-one children at the Frances Blend School for the Blind in Los Angeles were individually evaluated. They included totally blind children and partially blind youngsters who, it was felt, could advance best educationally by participating in a program that is not integrated with sighted children.

The investigation thus had the following purposes:

1. To develop a reliable assessment device for the evaluation of blind children's body-image.
2. To evaluate comprehensively the body-image of a select population of blind children.
3. To make comparisons, on the basis of the scores obtained, between various subpopulations within the total group studied—that is, sex, age, IQ, and so on.
4. To derive sequences of tasks related to body-image training of children without sight and arranged in order of difficulty.

Thus this investigation represents a status study. It is assumed that before attempting to educate children, one must first assess as accurately as possible the nature of the behavior to be modified. It is believed that more effective educational programs for atypical children will be derived from investigations such as that reported here.

A study of this nature must be followed by research to ascertain how best to elicit desired changes in behavior. For example, a two-year investigation (20, 24) of spatial orientation—walking straight, making accurate facing movements, and the like—in blind adults and blind children was followed by an eight-week training study in which it was determined that these attributes could be modified to a significant degree within the school environment (60). It is hoped that our work will stimulate similar follow-up studies.

Limitations

We surveyed the responses of 91 children. Some of the children obviously had motor and/or emotional problems which had not been properly assessed by school personnel. Unfortunately, we did not have funds to utilize a pediatriatic neurologist and other professionals and thus could not more accurately determine the nature of the population.

The evaluative tool had decided limitations. It involved a direct poll of the extent to which the child could accurately respond to a verbal direction. Thus responses were heavily dependent upon vocabulary and verbal comprehension, rather than more subtle qualities related to perceptions of their physical constitution. Other, perhaps sounder methods are discussed in Chapter 2.

2 REVIEW OF THE LITERATURE

The primary emphasis in this chapter is upon the manner in which body-image has been evaluated. Brief attention will be paid to studies of blind children; however, the writers are unaware of investigations related directly to the present concern. Most of the literature describing the characteristics of blind children has been contributed by clinicians rather than by experimenters. Such work is helpful, but the lack of normative data and sequences relating to body-image training is obvious to one who spends even a modest amount of time in a library search.

The project reported here was stimulated by the senior author's investigation of global perceptual attributes of blind children and adults (20, 24). The earlier studies centered around the accuracy with which the blind can execute facing movements, walk straight, judge gradients, report the tilt of surfaces walked, and evidence similar perceptual attributes. Subjects were asked to walk through 20-foot-long straight and curved pathways which were delineated by aluminum tubing placed waist high, about 18 inches apart; subjects were guided by two short sticks which were held in each hand and placed against each railing. After they had completed the task, subjects were asked to report whether the pathway they had just traversed was "straight," "curved to the left," or "curved to the right." Children blind from birth, who performed well on other tasks, were not able to make accurate left-right judgments. They detected gradients of approximately one degree and veered only about 25 degrees per hundred feet when asked to walk a straight line on a large athletic field; yet they seemed confused when asked to make judgments involving this kind of left-right discrimination.

It occurred to the senior author that research surveying the spectrum of judgments relative to the body might be productive. The present investigation was undertaken two years later. During this time, a study was made of the educability of blind children in dynamic spatial orientations—that is, ability to make accurate facing movements, to walk straight when requested, and to make a more complex perceptual judgment involving position relocation. The positive findings of this study suggested that the education of elementary-school blind children might involve two phases: *(1)* training in body-image and perceptual judgments of a relatively static nature; and *(2)*, an overlapping phase, requiring judgments to be made involving movement of the total body in space.

It was also believed that it is critical for the development of sound educational programs that a status study be undertaken. Two years ago the senior author completed an investigation which, it was hoped, would facilitate efforts to design meaningful perceptual-motor training regimes for retarded and neurologically handicapped children (18). With this same principle in mind, the present investigation was undertaken. It was hypothesized that before a program for teaching body-image is constructed, one must determine the extent to which blind children of various ages and mental levels are aware of their bodies, its movement capabilities, and its parts.

Our first step was to review the literature.

Assessment of Body-image

Over the years the concept of body-image has commanded more and more space in the literature of child development, psychiatric disorders in adults and children, and the psychology of education. To some, body-image encompasses movement capacities and the sensory impressions resulting from these movements (47). Others, operationalists, represent body-image as a test—for example, score the child's ability to name his body parts, to pick his silhouette out of a number of choices, to draw a child "about his age," or to construct a mannikin (1, 33, 51, 63).

In recent years interesting studies have been made of the relationship between body build of sighted subjects and selected personality trait scores and to relationships between body build and various social attributes. Some researchers seem intent upon evaluating the individual's judgments of his body's size and shape (28, 40). Others purport to measure the individual's feelings about his motor performance or attempt to assess more subtle judgments about the body—for example, the rigidity or penetrability of its psychological boundaries (12).

Such instruments have, with varying degrees of success, measured *something.* But relatively little attention has been paid to measuring the development of these qualities in normal children, and there apparently has been no interest in an experimental orientation to the evaluation of these attributes in blind children.

The major efforts in this area have centered on the manner in which body-image scores of several kinds reflect various personality disorders, rather than on how a psychologically sound child perceives his body and its movement attributes, or how groups of atypical children (other than the retarded) organize corporal judgments (9).

Several questions are suggested by these studies; occasionally researchers have attempted to provide tentative answers to them. For example, just how does the child's perceptions of his body and its functions influence and/or interact with his total perception of himself as an individual? See (61). Similarly, some investigators have explored the manner in which body judgment—that is left-right discrimination between body parts—relates to judgment of visual space (6).

In the following pages, several types of body-image tests will be explored. At the the end of this section, a rationale is presented for the construction of the body-image survey form utilized in the present investigation.

Body-image and Total Self-concept

Moderately high correlations have been obtained between measures of feelings about one's body and scores thought to evaluate a more comprehensive opinion of total worth (61). Piers and Harris, among others, developed a test intended to evaluate "The way I feel about myself," perhaps in an attempt to determine more exact relationships between body-image scores and measures of the total self-concept. In their factor analysis, six items emerged, among them "physical appearance and attributes." This factor was evaluated by yes-no responses to questions such as "I am good looking," "I am strong," "I have a bad figure," and the like. Other factors included "behavior" ("I do bad things"), "general and academic status" ("I am good in my school work"), "anxiety" ("I cry easily"), "popularity" ("I have many friends"), and "happiness and satisfaction" (61).

In 1953, Secord and his colleagues developed tests which measured "body cathexis" and "self-cathexis" (67). On the initial test, subjects were asked to score their feelings about 46 body parts, using a five-point scale ranging from "I wish change could be made" through "I have no particular feelings one way or another" (a neutral 3) to "I consider myself fortunate" (a positive 5). Their findings included a moderate relationship between scores evaluating the total self-concept and numbers obtained from the body-cathexis portion of the tests. Because the correlation was higher for the women ($r = .66$) than for the men ($r = .58$), these researchers suggested that women develop more anxiety about their bodies; it was also shown that fewer neutral scores were elicited from female subjects.

Unfortunately, neither Secord nor Piers and Harris seems to have worked much with children. Their tools have not been used to measure developmental changes that might occur in normal children. Absent also are applications of such tests to blind children.

The Performing Self

The maturing child perceives his body as a vehicle for motor performance. Thus it is reasonable to assume that his feelings about himself are related to the quality and quantity of movement he perceives his body capable of making. A recent summary of the literature dealing with the relationship between evaluation of aspiration level and physical performance described several devices that might be utilized to evaluate the manner in which a child evaluates his "performing self" (22).

The young child's degree of movement proficiency seems to influence personality traits manifested in early and middle adulthood. Jones, for example, in a longitudinal study, found that while differences in performance between early- and late-maturing boys tended to be blurred when they reached adulthood, personality trait differences persisted (44). Late maturers still seemed to be engaging in immature, attention-getting behavior in early and middle adulthood; the more secure early maturers, who physically bested their peers as boys, tended as adults to be more poised socially, more secure, and more successful in professional undertakings. *From Birth to Maturity*, a study published by the Fels Institute, presents findings similar to those outlined by Jones. Kagan and Ross report that males motorically active in nursery school evidenced traits and job-choice tendencies in early adulthood significantly different from those selected by males who had played passively in nursery school (45).

As well-adjusted normal youngsters mature, they begin to establish increasingly accurate concepts of expected performance goals. If, on the other hand, children perceive themselves as inept and/or weak muscularly, their feelings about their performance potentials are frequently unrealistic or are not voiced at all (3, 22).

Concepts of performance potential are not as easily gained by the blind as by the sighted child. The writers are unaware of studies of blind children's aspiration level in motor activities. One project, which compared the performances of a blind child and her sighted twin in mental, emotional, and motor tasks, elicited behavior relating to this question (25). The blind twin scored higher on mental and emotional tests; indeed, she was superior in most ways to her sighted sibling. She appeared in school plays and wrote poetry and in other ways seemed to be contributing to her sister's feelings of inferiority.

However, the blind sister, perhaps for the first time, was bested as they participated in the testing program. When she realized that her sighted sister was outperforming her in tasks involving strength, running speed, and distance throwing, she evidenced great concern. Her highly competitive nature emerged, and she became extremely agitated; apparently she was not meeting the usual expectations she had set for herself--that is, winning over her sighted sister.

However, in their daily life most blind children receive less exact information about their motor attributes than did the blind twin.

Evaluation of "Objective" Body-image

Draw-a-Person Test

This frequently used clinical tool, which was introduced by Mackover, requires the child or adult to draw a picture of a person (51). The technique has been used to evaluate personality, assess the presence of neurotic and/or psychotic symptoms, and measure intelligence in children. Modifications of this type of task are limitless and include "Draw your most hated person," "Draw the inside of your body," "Draw your most liked body part," "Draw a picture of what you would like to look like," and so on. Quality of reproduction, of course, is a function of the type of directions used, the individual's artistic ability and maturity of the individual, and innumerable factors inherent in the situation (9).

The validity of such tests has frequently been questioned. Brengelmann, for example, suggested that when such drawings are utilized as tests of personality, the ratings are largely specific to the investigator; hence it is difficult to compare results reported by different investigators. Swenson, who reviewed the findings and protocols of 87 studies that employed variations of the draw-a-person test, concluded that "definitive research on the basic meaning or significance of human figure drawings is lacking" (70). Another investigator found that artists ranked children's drawings of human figures in the same order (from "exhibiting talent" to "poorly drawn") as did psychologists who used the drawings to assess degree of emotional stability.

Despite this type of criticism, many investigators have attempted to use children's figure drawings to measure intelligence (33) or to evaluate personality and body-image. Their conclusions should be interpreted within the limitations cited. Most clinicians who use this device employ it within a battery of projective tests to gain a more global picture of the client; they do not attribute any great significance to a figure drawing in itself.

Kephart, in the film "Body-Image," suggested that figure drawings reveal that initially sighted children perceive the face and some of its parts, usually the eyes. But they tend to draw sticklike upper and lower limbs protruding directly from the circular head. Awareness of the trunk comes later, and final development of the body-image is reflected in a filling out of the arms (initially represented as spaghetti-like sticks) and the addition of details in the face, arms, hands, and limbs. In the same film, the manner in which a child arranges the parts of a mannikin further substantiates this order of body-part awareness: initially, the trunk is omitted from the construction, and the legs are placed directly under the head.

Ilg and Ames of the Gesell Clinic employed the Incompleted Man Test, a modification of the draw-a-person test. Sighted children were asked to add missing body parts to a half man. Evolution of body-image, they concluded, is reflected in test performance. It was found, for example, that about 50 percent of the five-year-old boys and girls could correctly place hair, eyes, ears, neck, arm, fingers, a leg, and a foot. Many children could do this by four; however, not until ages eight and nine did the children draw lines indicative of facial expression (41).

The two-dimensional draw-a-person test is, of course, not an appropriate measure for blind children. Perhaps a request to reproduce three-dimensional clay models would elicit a valid assessment of body-image. However, it would be difficult to separate ability as sculptors from the attribute the task purportedly evaluates. In a study discussed previously, a blind twin was asked to draw a picture of herself; she reproduced a face in which part relationships were inaccurate (25). The eyes she drew were simply round circles; they lacked the detail that only the sighted might be expected to perceive. Perhaps a three-dimensional mannikin, which could be fitted together, would provide a valid measure of the blind child's body-image. The writers, however, are unaware of studies in which this method has been used with the sightless.

Verbal Identification of Body Parts

Other experimenters have measured verbal responses to various directions. These instruments can be traced to the neurological test devised by Head in the 1930s (37, 38).

Benton and others have constructed a test of the accuracy and the speed with which a child can touch or move his various body parts when asked to do so. At one point the Benton test evaluates body-image by the accuracy with which the child can point to the body parts of a picture (7). In this, as in other tests, a child is given more credit if he constantly reverses left-and-right than if he is inconsistent in his left-right responses. To our knowledge no one has used the Benton test to delineate developmental trends in normal children or to evaluate blind children. In the main, it has been employed to assess children with various perceptual, neurological, and mental dysfunctions.

Ilg and Ames, who utilized a test similar to the Benton, have supplied somewhat comparable data; hence we may sketch in developmental patterns typical of normal children. By five, they found, children seem able to name the eye touched by an examiner and to identify the thumb and hands. Middle finger and little finger were usually not named until age six, while the ring finger usually was not identified with accuracy by sighted normals before the age of seven. Data relative to the normal child's ability to name other body parts apparently are not available. We also failed to uncover any such data on blind children (41).

Ilg and Ames also attempted to assess the emergence of the concept of left and right by asking children to name body parts when touched. By five, children know that there is a left and a right but are unaware of which is which. At six, about 60 percent still failed to make this kind of judgment accurately. Not until age seven could a majority correctly identify their left and right hands and differentiate their other body parts in a similar manner. And not until age eight could the children successfully project themselves into the examiner's reference system and correctly identify the examiner's left and right hands.

Although unilateral hand preference is seen as early as the seventh month, conscious awareness of the body's left-right dimensions is gained considerably later--at about the age of six or seven. Binet states that this kind of left-right concept is gained at age seven; Terman places it at six, and Piaget and Gallifret-Granjon agree with him (32, 34).

An important developmental study of left-right orientation was carried out by Spionnek who found that these perceptions evolve through several stages (34):

1. Stage One. The child cannot distinguish between the two sides of his body; this stage lasts from birth to about 3.5 years.
2. Stage Two. The child becomes aware that his left and right limbs are found on either side of his body, but is unaware of their location and of which body parts are called "left" and which "right." This stage usually occurs between ages four and five.
3. Stage Three. The child realizes that the left and right limbs and organs are found on opposite sides of his body, without knowing that they are right or left parts (between ages six and seven).
4. Stage 4. During the fourth stage the child comes to know precisely which parts of his body are right and left (between ages eight and nine).

By using the methods of classic conditioning, Spionnek produced associations between the names of limbs, their movements, and the visual stimuli preceeding movements. Correct responses relative to these discriminations were elicited two years before children could normally be expected to make these kinds of judgments.

An unpublished study by the author and one of his students also demonstrated that left-right discriminations in minimally neurologically handicapped children can be significantly improved through training in movement activities that incorporate left-right decisions made by the child--for example, "Roll over on your left shoulder," "Jump and turn to your right," and so on (23).

In experiments in which two choice answers are required (that is, left or right), it may not be assumed that "correct" answers are being elicited unless a population of children responds accurately about 75 percent of the time. Thus it is apparent that not until about age seven can normal children correctly identify their left and right body parts and sides consistently.

The primary criticism that can be leveled against tests that purport to evaluate body-image by assessing accuracy of verbal requests to touch various body parts, of course, is whether they are testing a basic precept, or merely are a reflection of the quality of a child's vocabulary. Is ability to point to a leg when asked to do so related to how well the child perceives the leg (movement capabilities of the limb and its weight and conformations), or does an accurate response depend upon his knowing the meaning of the term "leg"? Children who can use their body parts may lack the necessary vocabulary to identify them on request. Head and others have assumed that the neurologically impaired child has difficulty crossing his body (for example, "Touch your left ear with your right hand"). However, it is believed equally valid to assume that failure to react to directions such as this may stem from the child's inability to remember and to follow a two-step verbal direction more complicated than is represented by a simple command to "Touch your ear."

Imitation of Gestures

A recently published test of body-image has to some degree reduced the effects of verbal content upon scores (8). The experimenter, facing the child, scores the accuracy with which he can reproduce both simple and complicated limb and hand gestures. In general, three-year-olds are only about one half as capable as six-year-olds in this kind of task; when responses to complex moving gestures are evaluated, the three-year-olds are only about one third as proficient as children twice their age.

Such a test is, of course, inappropriate to the evaluation of blind children (unless some modification is developed in which blind children are permitted to tactually inspect the gestures of the experimenter). It is discussed here in order to present a more comprehensive survey of body-image tests.

The accuracy of the child's visual perceptions of the examiner's movements undoubtedly influences scores on the gesture imitation test. Thus, a child with perceptual difficulties, independent of his perceptions of his body and its parts, probably would not perform as well as children whose visual-perceptual processes are not deficient.

Perception of Body Conformations

Tests for assessing the child's awareness of his body and his feelings about its shape and function include the somatic apperception test developed by Adams, which employs a mannikin and/or outlines of bodies with various conformations (1). As the individual constructs a mannikin or selects the outline he perceives as most closely conforming to his own or to some ideal body-image, various measures may be collected. The outline chosen may be compared to his actual conformations.

Tests of this nature have not been employed with the blind. However, they might be appropriate if the two-dimensional silhouettes were transformed into three-dimensional models which the blind child could tactually inspect.

Projective Test of Body-Image

Fisher and Cleveland, using responses from the Rorschach, have attempted to measure what they term a "barrier score," which is defined as the extent to which the individual seems to impose a rigid psychological boundary between himself and his environment. The authors could find no study that applied this kind of measure to blind children (12).

Judging Body Dimensions

A test to ascertain the accuracy with which individuals perceive their heights, widths, and thicknesses has been devised by Dillion (28). The subject is asked to adjust (with pulleys) wooden frames until they seem to replicate his body's width and height. Men who have distorted perceptions of male superiority tend to judge themselves larger than they actually are. Here again, there have been no developmental studies with blind or sighted children as subjects.

The senior author devised a body-image rating scale which incorporates some of the major concepts found in the literature (16). It was validated using children from four to seven years of age. Two primary concepts underlie this scale: *(1)* body-image is formed at the conceptual level, as well as at the dynamic level, as the body interacts with objects in the environment; *(2)* correct assessment of developmental stages in the acquisition of body-image requires that both static and dynamic judgments be made (that is, "As I walk around you, tell me when I am nearest your left or right side").

The scale is an assessment device which suggests various training procedures.

Its 16 steps are not mutually exclusive. For example, from ages three and four children also acquire an awareness of some of the body parts while organizing their body planes.

Several workers have claimed that body-image is essential to effective motor skill performance (46). Critical to Kephart's theory is the notion that a well-established concept of left and right body dimensions will transfer to the sighted child's perceptions of correct dimensions in visual space. If a child's frame of reference, from which he makes such spatial judgments, is not well established, particularly with regard to left-right discriminations, he will frequently confuse left-right dimensions of words and of letters. "No" will be perceived to be the same as "On," and "d" and "b" will be confused with each other.

Data supporting such a contention are scarce. In a recent study Ayres found no significant correlation between a test of body-image emphasizing laterality and a score in a test of how well the children organized left and right in visual space (6).

However, Davidson's findings suggest that at age five children exhibit the same confusion when attempting to discriminate between "b" and "d" that they exhibit when attempting to name their left and right hands (26). This relationship does not necessarily infer causality. Further research on this subject would be helpful. This kind of left-right confusion can inhibit the educational progress of blind children. They will have problems finding their way around their neighborhood and school environments. And it may be difficult for them to learn to use a braillewriter, and to read braille, if they have no clear-cut perception of the left and right dimensions of the world.

The theory of perception that best supports the relationship between bodily perceptions and judgments made in visual space was outlined by Wapner and Werner in 1949 (76). Their contention that body tonus influences various spatial judgments is supported by evidence that experimental alteration of neck-muscle tension will influence perception of the verticality of luminous rods in otherwise dark rooms, or perception of the vertical made kinesthetically and/or with tactile cues. In subsequent work Wapner found that the tendency of tonal alternations to influence spatial judgments was less pronounced in late than in early childhood (74). These data can be taken to indicate that while during the early years of life (zero to seven years) children are somewhat dependent upon their bodily perceptions when making spatial judgments, as late childhood is reached, body-visual space relationships become less definitive. The senior author has noted this same tendency to dissociate body from left-right judgments in space as a function of age in children he has evaluated clinically.

In their thorough survey of the literature on spatial orientation Howard and Templeton state that sighted children are first able to recognize and to replicate figures without any cognizance of a stable reference point (39). Only later do children become able to place them in correct positions relative to one another and relative to up-down and left-right dimensions. It might be assumed that some kind of body-image training might enhance and hasten this "tying down" of spatial figures to stable spatial reference points.

In a recent study by the senior author, a high correlation was found between a score obtained in a brief survey test of body-image and the subjects' total score in a battery of tests evaluating ability, balance, ball-tracking, and similar attributes. Moderate to high correlations also have been found between scores obtained on the Benton Finger Identification Test and tests of manual dexterity (18, 53). Although the subjects in both these investigations were atypical children (retarded and neurologically handicapped), it is apparent that body and hand "image" may have something to do with ability to move the total body and the hands and fingers. Whether movement-experiences aid children's perceptions of their bodies, or whether gaining a heightened awareness of the body aids in its movements, is unclear. Perhaps a third factor, brain damage or verbal understanding, may contribute equally to ability to move the body and to an awareness of its parts. In any case, these relationships should be investigated more thoroughly to determine causality, if any, and the direction of this causality.

While developmental studies of the body-image of blind children are absent in the literature, some clinicians have begun to engage in longitudinal studies of individual children. Motor, intellectual, and emotional development of ten children with retrolental fibroplasia (RLF) has been surveyed by Parmalee and his colleagues s (58), while Jerome Cohen has published similar findings on 57 RLF children (13). Freedman has discussed the emergence of smiling in blind infants (31), and several authors have devoted themselves to the ego development of blind children (31).

Parmalee, in a recent article, has encouraged the mothers of blind children to give their infants as much tactual, auditory, and kinesthetic stimulation as possible. He suggests that enriched manipulatory experiences should be introduced as early as possible into the life of the blind child, and that mobility should be encouraged as soon as the child evidences appropriate supportive behavior (57).

Within the past several years information relating to some of the basic perceptual attributes needed by blind children as they mature has begun to appear in the literature. For example, Brown and Jessen have developed an orientation mobility test battery at the Oregon State School for the Blind. This group of tasks includes facing movements and various self-care skills (10).

Dr. Francis Lord and his colleagues at California State College in Los Angeles have also recently published a scale of orientation and mobility skills for young blind children (48). These investigators have attempted to establish norms for a number of tasks that contribute to mobility and to daily living in and around the home. Their subjects were 200 children from three to twelve years of age, selected because they were purportedly free from mental, emotional, and other defects.

Some of the tasks involved were making various left-right judgments; others involved identifying various body parts. Because the primary focus of Lord's investigation was not solely upon body-image, the tasks employed represented only a cursory assessment of the attributes surveyed in the present investigation. For example, a child received a "fail" score on one section of the battery if he did not correctly identify four body parts. It was not possible to determine from the score which part or parts the child failed to identify; if he missed one or all four, he was awarded a "fail" score.*

Lord's study presents data which represent an important milestone in the mobility orientation of blind children. The extensive battery of tasks should provide educators of the blind important operating principles; and researchers should also be stimulated to extend their findings into problems that could only be explored briefly in the present study. A comparison of Lord's data and the findings of this investigation is presented at the conclusion of Chapter 4.

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*The investigators apparently made judgments concerning the emotional, motor, and mental attributes by observation and consultation with individuals familiar with the childrens' conduct. No screening tests through which the childrens' motor, perceptual-motor, or emotional states might have been measured were presented in the initial portion of their monograph.

3 METHODS AND PROCEDURES

Developing the Evaluation Device

During the year prior to this investigation, some teachers at the Frances Blend School experimented with their own modifications of a 16-step sequence developed for retarded and neurologically handicapped children by the senior author (16). Their comments on its use with the blind were solicited.

Our assessment device was pretested on several blind children. For example, it was found that some of the instructions were too complex. Phrases such as "With your left hand touch your left elbow" were shortened to "Touch your left elbow." The box used to evaluate object-to-body relationships was reduced in size to facilitate *handling.* *

The final revision of the assessment inventory resulted in five sections: Body Planes, Body Parts, Body Movements, Laterality, and Directionality. The first section, Body Planes, contains three subsections of five items each. Two of the subsections attempt to determine how well the children can locate themselves relative to their body planes—that is, their sides, front, and back. (See Appendix B for complete inventory.)

The second section, Body Parts, contains twenty items in four subsections. Parts of the face, hands, and gross aspects of the body and parts of the limbs, and so on (in a subsection called "Complex Body Parts") are contained in this section. The third section, Body Movement, seeks to determine how accurately a child can respond to requests to move his body in a gross manner—for example, "Walk forward toward me"--and also to respond accurately to requests to make various limb movements—for example, "Bend your arm at the elbow."

The fourth section, Laterality, was designed to determine not only whether a blind child can accurately identify his left and right body parts (arms, legs, and so on), but also how well he can move himself so that his left or right side or hand are nearest to objects, and conversely how well he can place objects in relation to his left and right sides while remaining in one place.

The final section, Directionality, measures how well blind children can determine the left and right sides of objects and of other people. We expected that it would be far easier for the child to say, what was the left side of a desk (using himself as a reference point) than to move himself into a reference system of another person and attempt to judge left and right hands, and so on.

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*The junior author spent several weeks reviewing literature on the attributes of blind children; she also spent several hours a day in classes with younger children at the Frances Blend School to become acquainted with the nature of blind children, to enable some of the younger emotionally disturbed children to become acquainted with her, and to render more of them "testable" in that phase of the program.

Administration of the Test Battery

Children were evaluated between 9:15 A.M. and 2:00 P.M. each day, and were tested individually in a room in which there were no distractions. A child was considered "untestable" when he refused to leave his teacher to go with the tester, or when on arriving at the testing room he refused, or seemed unable to comprehend, directions. Each "untestable" child was contacted twice by the experimenters before he was dropped from the study.

During the initial use of the test battery, both experimenters were present to determine interobserver reliability. Eighteen children were tested twice to determine test-retest reliability. The equipment utilized included a mat, a box one foot square, a chair, and a clipboard for the data collection sheet.

After introductions the tester led the child to the testing room and said, "We are going to play a game. I want you to listen carefully to everything I say. When you finish each part of the game, I will say 'Thank You' and then ask you to do something else. Are there any questions?" (Questions were answered.) "Are you ready to play?"

As the testing progressed, the child was moved from place to place slowly; several seconds elapsed between the various parts of the testing program. Care was taken at all times to protect the child from inconvenience. For example, before he was asked to place his back against the wall, the child was asked to reach out and touch the nearest wall, and his hand was guided so that this could be accomplished quickly and easily.

The order of testing was always the same, proceeding from parts one through five. Although attention span problems and similar difficulties might have influenced the results of test items administered last, we believed it better not to randomize the order of the presentation, because the initial tasks in the battery, and within each subtest, were considered easier than those that followed. We thought that less valid data would result if too-difficult items were presented first; this resulted in the children's being frustrated and failing.

After each response was observed, its accuracy was scored on a pass-fail basis. In addition notes were made after each response if the child pointed to a body part, or made some response, other than that requested; thus, if a child pointed to his cheek instead of his chin, this was noted on the data collection sheet.

After each response was made by a child, care was taken not to positively reinforce the response. Thus after each response, the phrase "Thank You" was used by the tester instead of "OK," "All right," and the like, which might have indicated to the child that his response was correct, even though it might not have been correct.

Data Analysis

Test-retest reliability of the collected data was determined by Pearson product-moment correlation computed between the total battery scores obtained from the 18

Plate 1. Testing Procedures: Body Planes. "Move so your stomach is touching the mat."

Plate 2. Testing Procedures: Body Parts. "Hold up your first finger."

Plate 3. Body Movements. "Bend one knee."

Plate 4. Laterality. "Bend over slowly and touch your left foot."

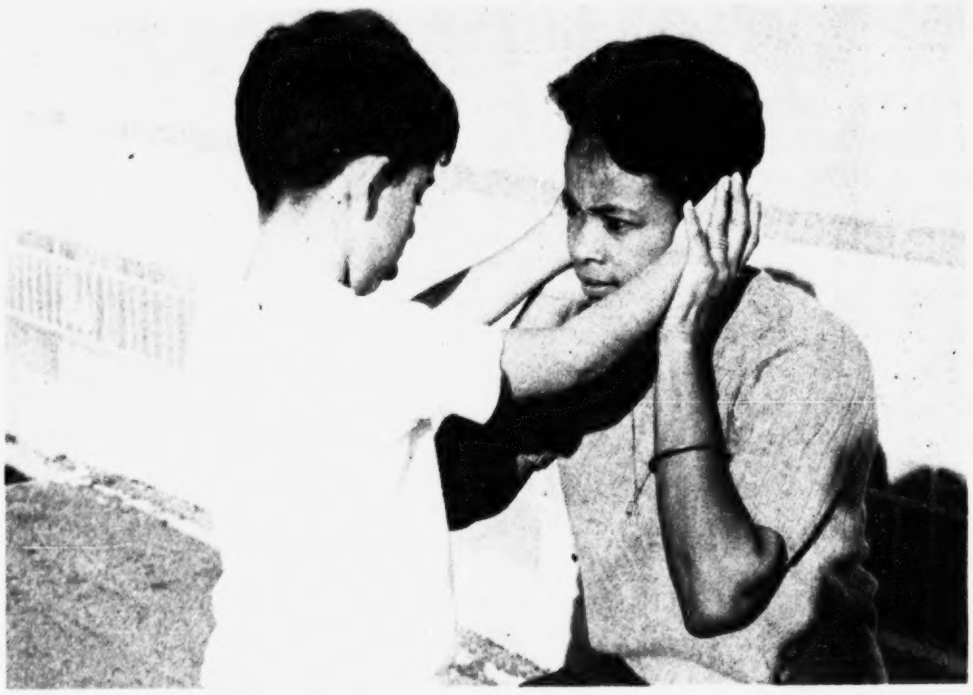
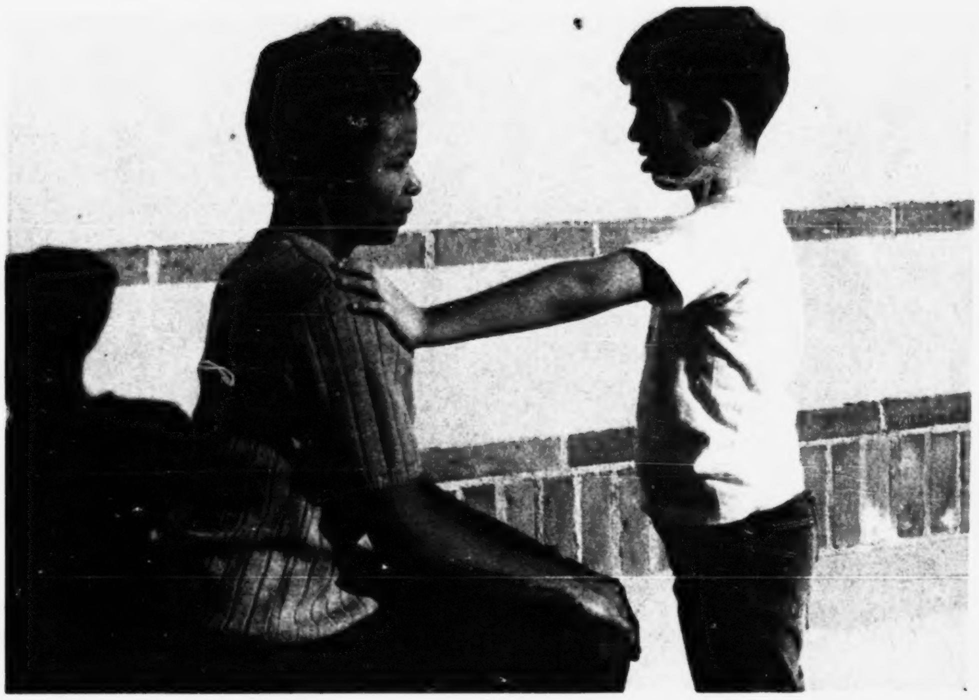


Plate 5. Projection into Another Person's Reference System. "Tap my right ear."



"Tap my right shoulder."

subjects in the first and second testing sessions. Interitem correlations were computed also, utilizing the scores of all subjects. Additional correlations were obtained between the available IQ scores and the total test battery, and between age and the scores obtained.

Analyses of variance were computed to determine intergroup differences, followed by dichotomous comparisons using Fisher "*t*" to further assess the significance of the differences in mean scores on the total test battery and on subtests between various groups. The intergroup comparisons computed included sex differences, age differences, comparisons of the responses of the partially sighted and the totally blind, and IQ differences (scores of children with IQ 80 and above were compared with the scores of children with IQ 79 and below).

The percent of correct responses on each of the test items was determined to find the approximate order of difficulty represented by various components on the test and on the subtests. This determination was made on the five part classifications contained in the test battery. The data were analyzed also to determine the order of difficulty of the perception of movement, the accuracy of identification of body parts, the accuracy of object-to-body relationships, and the relative difficulty of left-right judgments, regardless of the section of the test containing these items.

Summary

The data were summarized, and their implications for the body-image training of the blind were formulated. These training sequences were derived from the data of this investigation; the methodologies were obtained from a review of the literature. Implications for further research and for the improvement of testing procedures were drawn up later.

4 RESULTS AND FINDINGS

Our findings are organized in three sections. The first is an overview of data derived from test scores. This section contains data relative to the age, intellect, and general composition of the population, and gives the mean scores and interrelationship of scores, both on the total test battery and on its components.

The second section contains comparisons among various subpopulations. This section compares the differences in scores recorded from children with IQs below and above 80, outlines differences in the scores obtained by males and by females, and presents findings obtained on children of various ages. The scores of children classified as partially blind are contrasted with those of totally blind children.

The final section contains developmental sequences suggested by the data. The order of difficulty of tasks involving simple body part identification is presented, as are similar sequences involving body-to-object relationships, left-right judgments, and movement tasks. We believe these sequences have important implications for educators working with the blind. Those who work with other categories of blind children may, without much difficulty, construct similar sequences using the body-image measuring device employed here.

Finally, the educational implications of the findings and of the developmental sequences are explored.

Subject Population, Mean Scores, and Intercorrelation of Subtest Scores

Ninety-one children were tested; 50 boys and 41 girls. An additional seven were found to be untestable; they refused to leave their teacher and go with the tester, despite several weeks spent in the classroom with most of them, talking to them and otherwise attempting to establish rapport. The "untestables" were younger children in the first year at school.

The mean age of the 91 children tested was 10.06 years (SD = 2.59) with a range of 5 to 16 years. Eighteen were totally blind; the remaining 73 were partially sighted. No more exact evaluation of the degree of sight was obtained from the children's records, nor was any further assessment made by the investigators. One of the children tested was adventitiously blind, the victim of two separate accidents during his fifth year; the remainder were impaired visually from birth. The children's IQs ranged from 57 to 144, with a mean of 88.32 (SD = 21.37). The IQs of only 59 of the subjects were available.

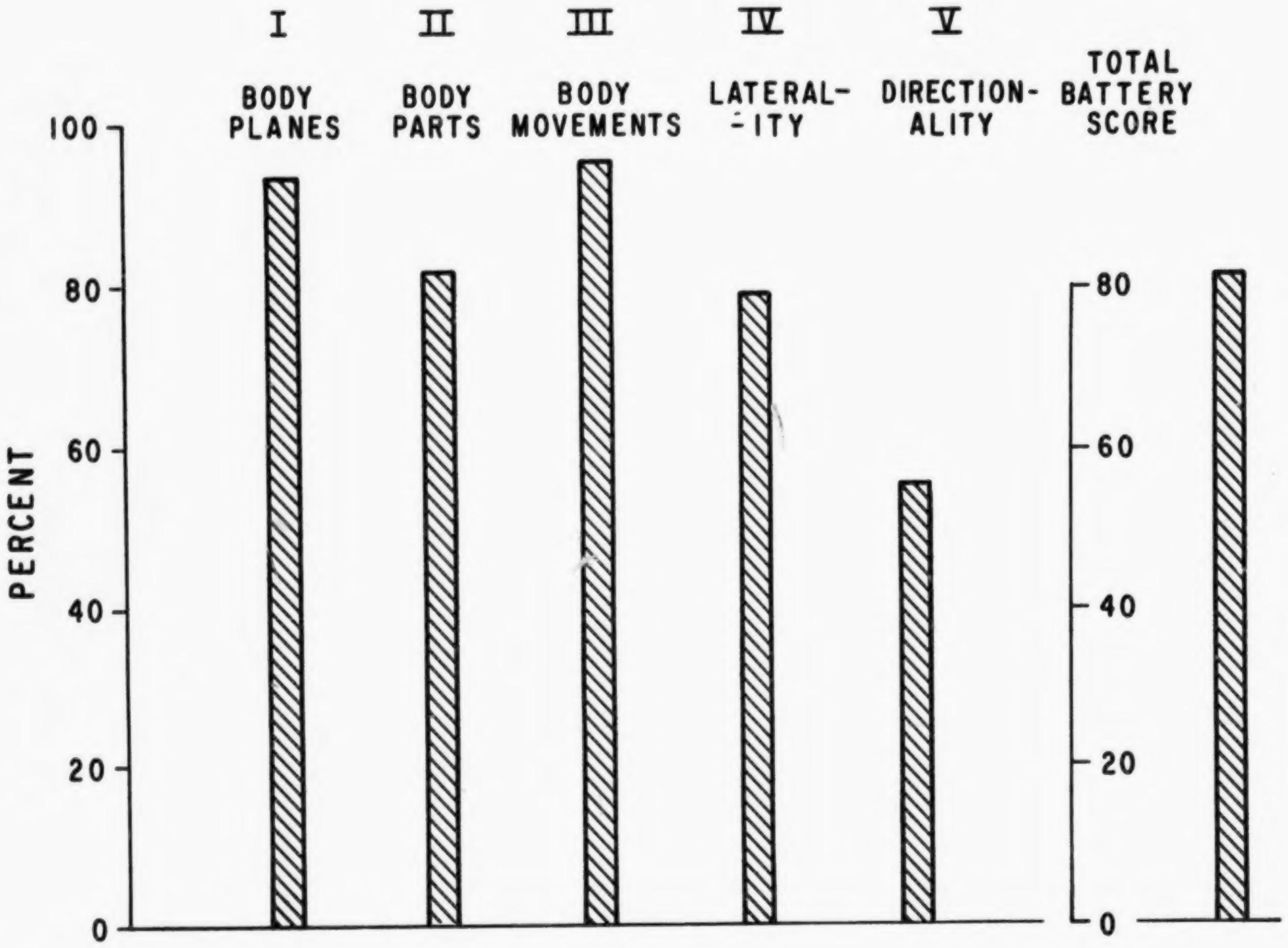


Figure 1. Percent of Correct Responses

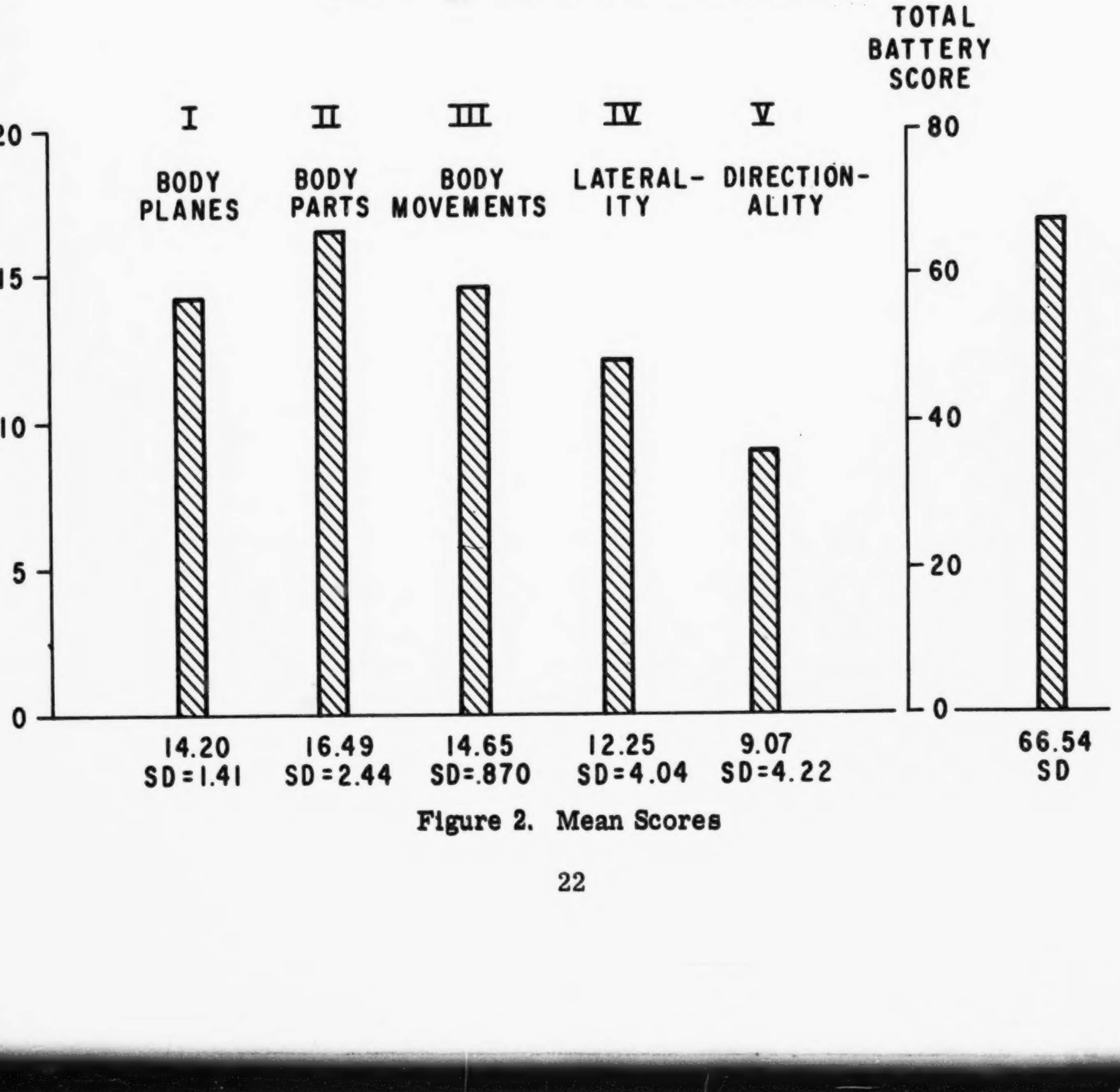


Figure 2. Mean Scores

Eighteen of the children were tested twice, to determine the reliability of the instrument scoring. A test/retest correlation of .82 was obtained.

Inspection of Figures 1 and 2 reveals that the first three sections of the test were the easiest; the final section, which involved directionality and the projection of the child into the experimenter's reference system, was more difficult than the section that contained tasks involving accurage left-right discrimination (laterality).

Eighty percent of the subtasks in the first three sections could be carried out by the subjects, contrasted with less than 60 percent of the tasks within the final section. Based upon the total percent of correct responses within the various subsections, the order of difficulty (from easiest to most difficult) appears to be Section III (Body Movements), Section I (Body Planes), Section II (Body Parts), Section IV (Laterality), and Section V (Directionality). The implications of this order, with a more detailed analysis of the order of difficulty of various subtasks, are discussed in the third section of this chapter and in the following chapter.

Although Figure 2 indicates that this order of difficulty is somewhat different from one based on percent of responses (Figure 1), it must be remembered that a score of 20 was possible in Section II, while a score of 15 was the highest attainable in the other four sections.

Table 1

Intercorrelation of Scores from Test Sections and from Total Test Battery

	I	II	III	IV	V	Total Score
I	1.000					
II	+0.414	1.000				
III	+0.313	+0.279	1.000			
IV	+0.422	+0.462	+0.248	1.000		
V	+0.171	+0.445	+0.171	+0.422	1.000	
Total Score	+0.546	+0.726	+0.383	+0.828	+0.763	

Table 1 (a matrix of intercorrelations of subtests with each other and with the total battery score) indicates that the attributes evaluated in each subsection are moderately specific. The highest correlation was .46 when scores of the Laterality and Body Part sections were compared. The scores from sections II, IV, and V, were highly correlated to the total battery score (.73, .83, and .76). The combined scores obtained from sections II and IV correlated highly with the total battery score ($r = .92$). This indicates that the tasks contained in these two sections may form a valid and efficient screening test which might prove helpful to the classroom teacher and to others whose time may be limited.

Comparisons of Subpopulations

Sex Differences

There were no significant differences between the scores of the 50 males and 41 females in the total test and in the subtests (Table 3 and Figure 3). Although the

Table 2

Comparison of Scores Obtained from 18 Totally Blind Children with Those Obtained from 73 Partially Blind Children in Body-image Test and Its Subsections

	Population	*M*	*SD*	*SE Mean*	*Se Diff*	t	*sig (%)*
Body Planes	Totals	14.83	.69	.167	.274	2.878	1
	Partials	14.04	1.85	.218			
Body Parts	Totals	18.56	1.46	.354	.450	5.709	1
	Partials	15.99	2.36	.278			
Body Movements	Totals	14.72	.93	.225	.246	.365	n/s
	Partials	14.63	.85	.100			
Laterality	Totals	14.11	1.97	.477	.694	3.33	1
	Partials	11.80	4.28	.504			
Directionality	Totals	10.50	3.96	.960	1.08	1.65	n/s
	Partials	8.71	4.21	.496			
Total Test Score	Totals	72.17	7.68	1.863	2.19	3.20	1
	Partials	65.15	9.79	1.154			

Table 3

Comparison of Mean Scores Obtained from Females and Males on the Body-image Test

Category	*Sex*	*Mean*	*SD*	*SE Mean*	*SE Diff*	t	*sig*
Body Planes	M	14.20	1.79	.255	.360	.000	ns
	F	14.20	1.61	.254			
Body Parts	M	16.30	2.49	.355	.514	.836	ns
	F	16.73	2.35	.371			
Body Movements	M	14.60	1.00	.143	.177	.620	ns
	F	14.71	.67	.105			
Laterality	M	11.74	4.49	.641	.826	1.37	ns
	F	12.88	3.30	.522			
Directionality	M	8.98	4.48	.640	.887	.214	ns
	F	9.17	3.89	.615			
Total Battery Score	M	65.62	11.10	1.58	2.01	1.01	ns
	F	67.66	7.84	1.24			

girls achieve superior mean scores in four tests, these differences were not statistically significant. Nor were there significant differences between IQs of males and females. The mean IQ of males was 88.20, and of females, 88.34 (*t* = .007). It is interesting to note, however, that the IQs of the males were not as highly correlated to the total battery score as were those of the females (.41 and .47). However, there was no significant difference between these *r*s.

Partially vs Totally Blind

Table 2 and Figure 4 indicate that the 18 totally blind children performed significantly

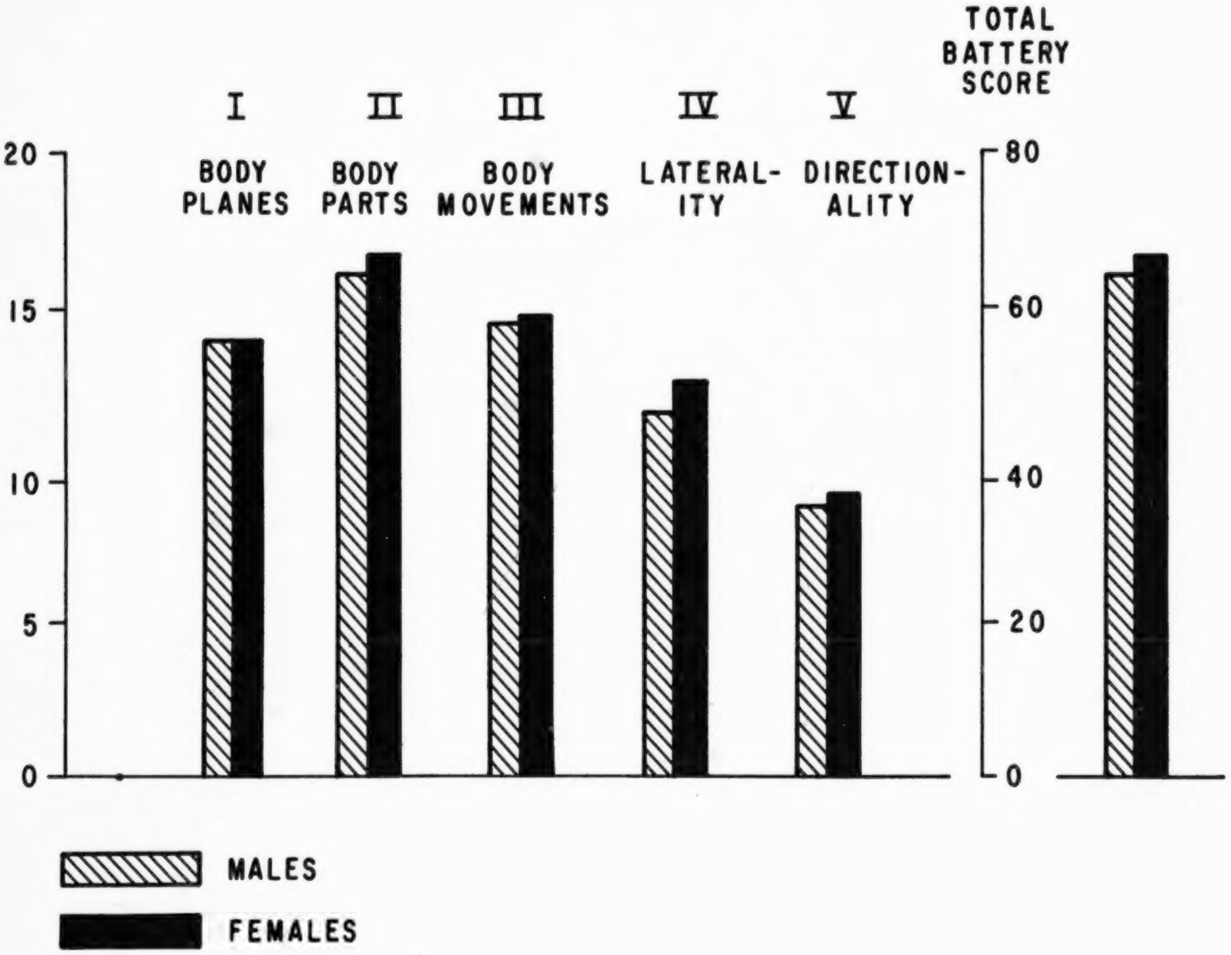


Figure 3. Sex Differences, Based upon Mean Scores

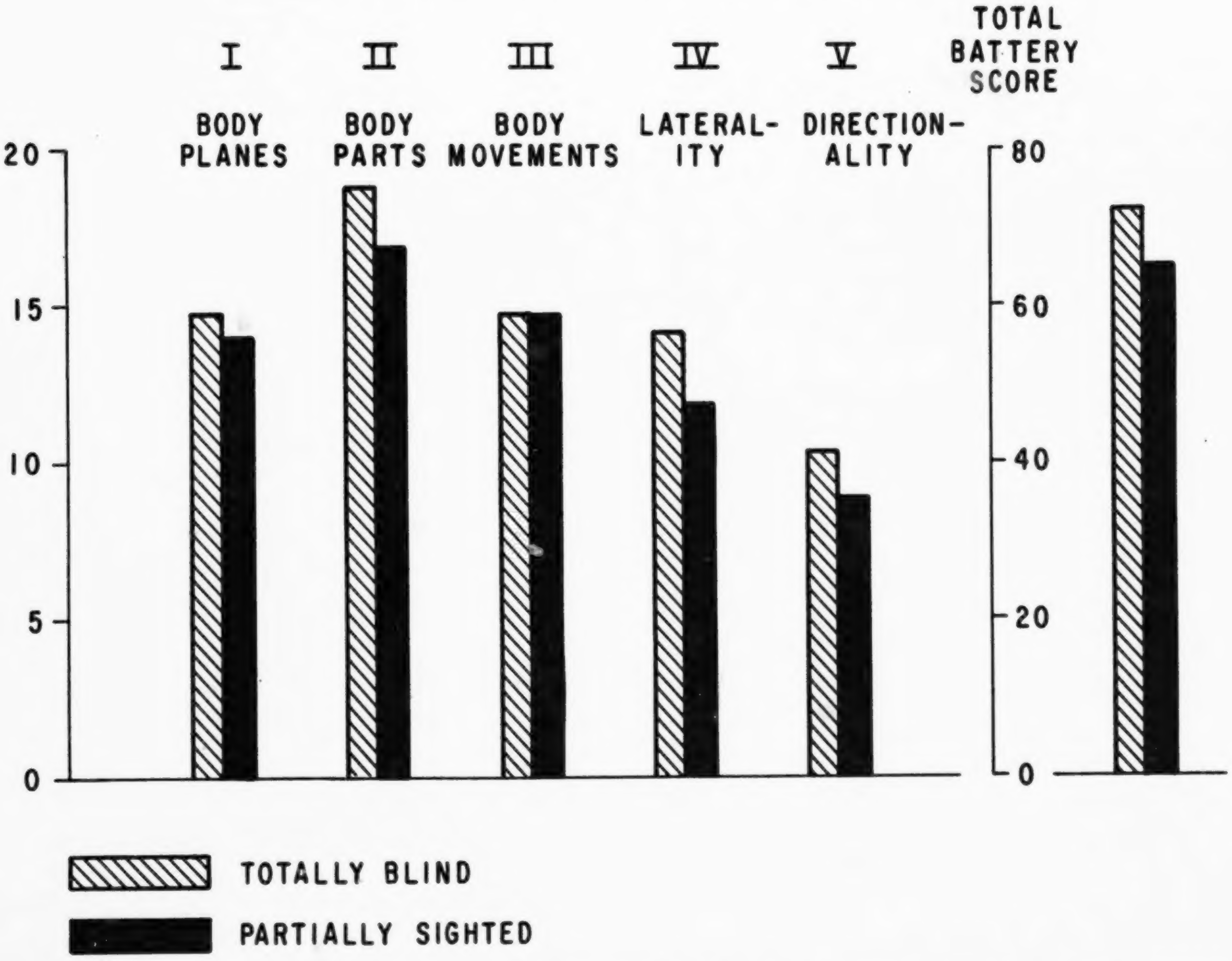


Figure 4. Totally Blind vs Partially Sighted, Comparison of Mean Scores

better than the 73 partially sighted children on subtests I, II, IV and on the total test battery. Several points must be kept in mind, however, when interpreting these findings. The partially sighted children were judged by public school personnel, on the basis of interviews, to be suited educationally to a school environment that included only blind children. While detailed evaluations of their emotional makeup were not carried out, and were not available in school records, it might be presumed that there was a greater incidence of emotional problems in this subpopulation than in the group of totally blind youngsters who were assigned to special classes in regular public schools. (The latter is the practice for the more able partially sighted youngsters within the Los Angeles City schools.)

Comparison of IQs reveals other differences. The mean IQ of the totally blind children was 107, and of the partially sighted, 88. While these differences were not significant at the .05 level, it is apparent that they could have resulted in a difference in verbal comprehension and in other attributes inherent in the test tasks.

Further, about 40 percent of the partially sighted, but 53 percent of the totally blind, could identify the left side of one of the experimenters (with tactual inspection) when facing her. Similarly, 77 percent of the partially sighted and 95 percent of the totally blind could identify their own left and right body parts. (See also Table 16, Appendix A.)

Table 4

Comparison of Scores on Body-image Test Achieved by Children with IQs Below 80 and 80 and Above

Test	*Group*	*Mean*	*SD*	*ER Mean*	*SE Diff*	t	*Sig (%)*
I. Body Image	Above 80	14.96	1.12	.03	.23	2.24	5
	Below 80	14.46	.18	.23			
II. Body Part	Above 80	17.16	3.61	.67	.79	2.32	5
	Below 80	15.32	2.07	.42			
III. Body Movements	Above 80	14.90	.54	.10	.16	4.88	1
	Below 80	14.10	.68	.13			
IV. Laterality	Above 80	13.30	3.79	.70	.99	.67	ns
	Below 80	12.64	3.39	.69			
V. Directionality	Above 80	9.66	4.47	.83	1.51	1.06	ns
	Below 80	8.44	4.06	.80			
Total Score	Above 80	71.61	8.20	1.42	2.14	2.97	5
	Below 80	65.24	7.82	1.59			

Intellectual Differences

The Frances Blend School has two classes of children classified as educable and trainable retardates (IQs 40 to 80). We believed it important to survey differences in test scores achieved by children with IQs above 80, and those whose intelligence is apparently impaired (IQ 79 and below). The Hayes-Binet was utilized as a screening tool; it had been administered, from one to five years before the investigation, to 59 of the subjects.

As can be seen in Table 5 and Figure 6, there were significant differences in the

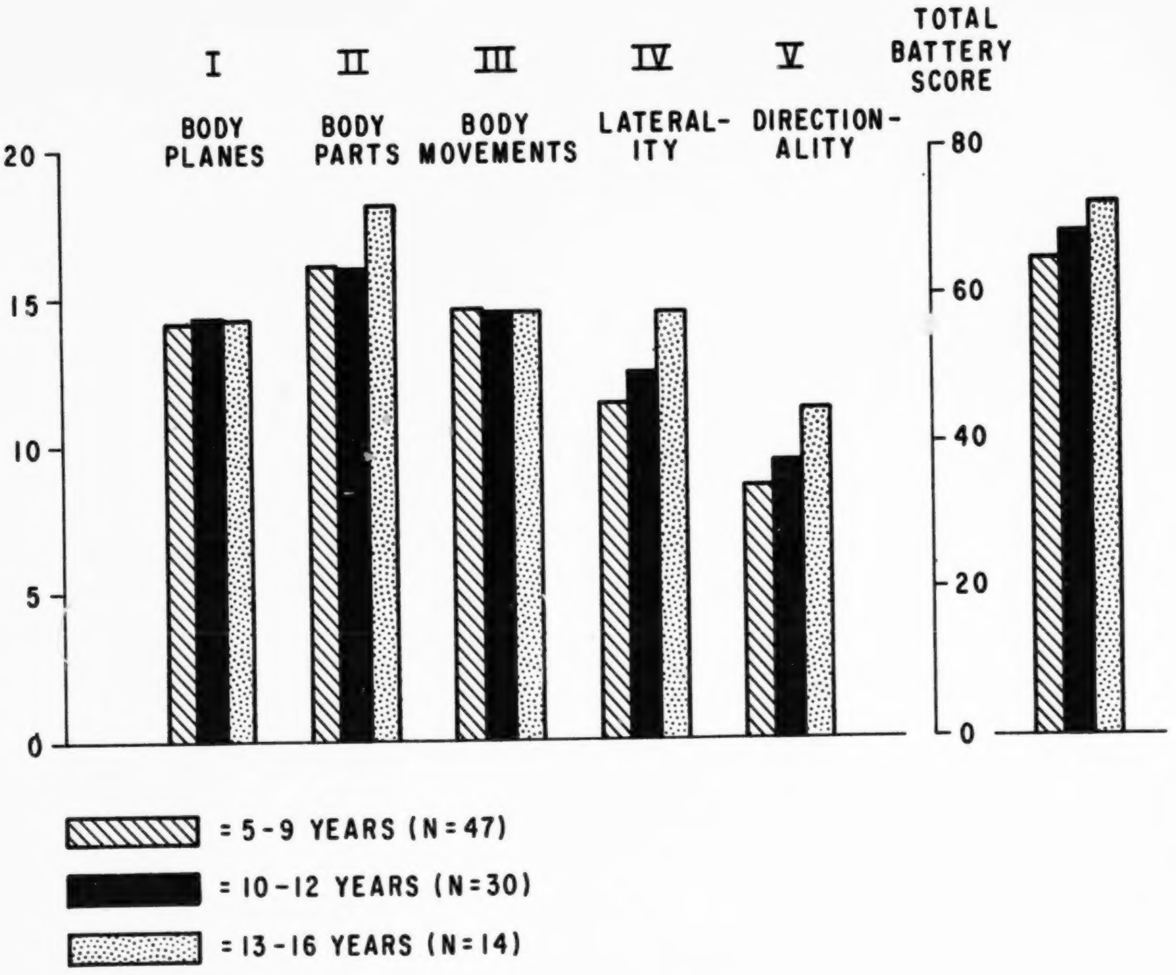


Figure 5. Comparison of Mean Scores by Age

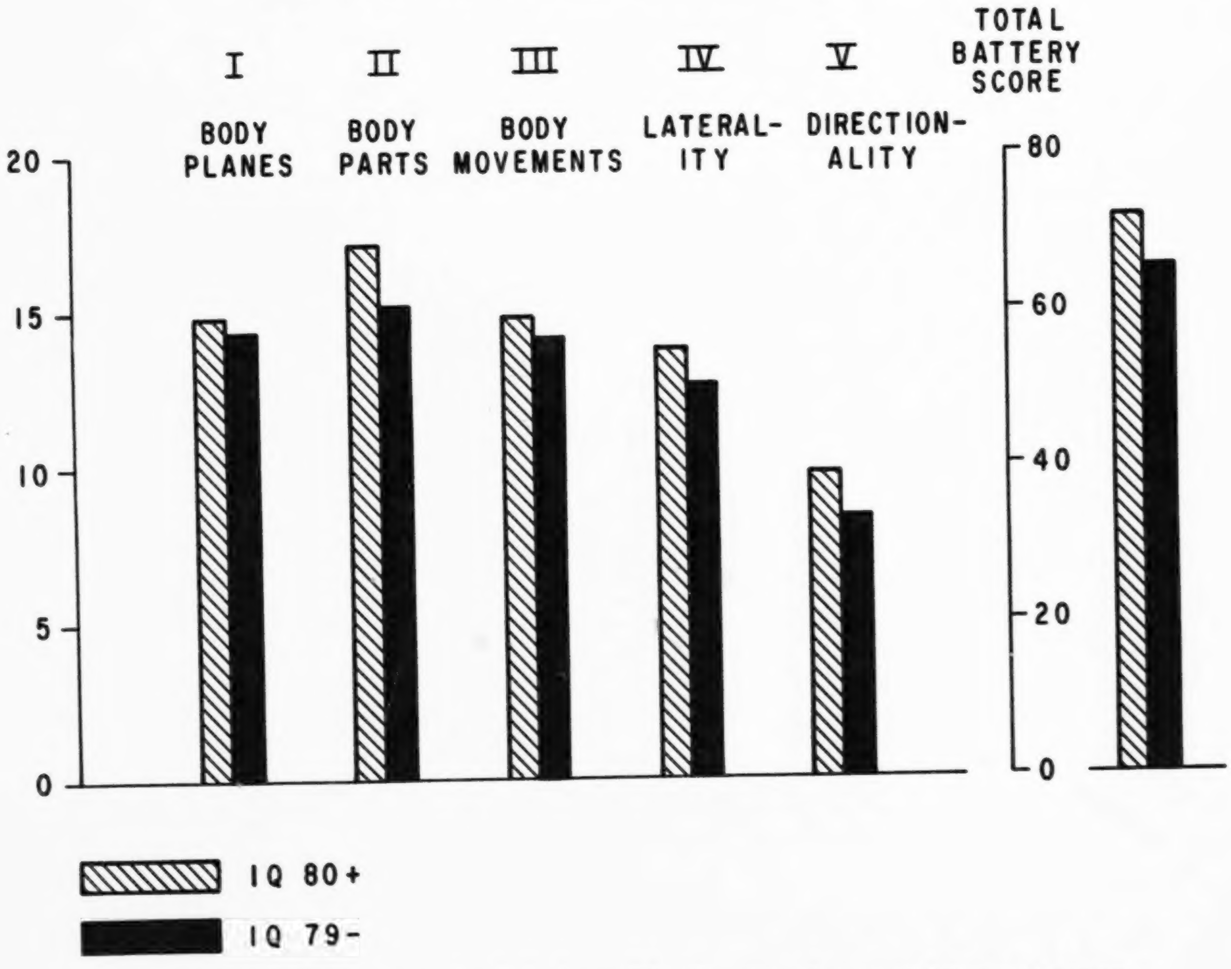


Figure 6. IQ Above and Below 80, Comparison of Mean Scores

Table 5

Mean Scores by Age for Body-image Tests and Components

Sections	*Group**	*Mean*	*SD*
I. Body Planes	a	14.06	2.05
	b	14.47	1.15
	c	14.07	1.39
II. Body Parts	a	16.21	2.36
	b	16.17	2.24
	c	18.14	1.64
III. Body Movements	a	14.68	.88
	b	14.60	.88
	c	14.64	.81
IV. Laterality	a	11.47	4.47
	b	12.47	3.25
	c	14.43	1.12
V. Directionality	a	8.26	4.41
	b	9.30	3.82
	c	11.29	3.49
Total Score	a	64.66	10.99
	b	66.57	67.95
	c	72.79	5.91

*Group a: 5 to 9 years (*N* = 47).
Group b: 10 to 12 years (*N* = 30).
Group c: 13 to 16 years (*N* = 14).

total battery and in subtests I, II, and III. While no significant differences were found between scores on sections IV and V, in all cases the performance of children with higher IQs was superior.

The correlation between IQ and the total test battery was .43 (p = .01); this indicates a moderate positive relationship between IQ and the test scores of the 59 subjects whose IQs were available.

Further analysis revealed the following: 63.6 percent of the children with IQs above 80 could correctly respond to the direction "Touch your upper arm," whereas only 29.1 percent of the less gifted children could do so. Similarly, 75.7 percent of the children with IQs above 80 could determine (while placing their hands on the tester's shoulders) whether the tester was bending to the left or right, while only 41.6 percent of the children with IQs below 79 could do so. A more detailed analysis of the percent of accurate responses on the various test components is given in Appendix A, Table 18.

Age Differences

Analysis of variance in total battery scores of three age groups (5 to 9, 10 to 12, and 13 to 16) revealed significant differences (F = 3.88, p = .01). There were significant differences between the total battery score of the younger two groups and the older group (t = 2.83, p = .01 and 3.53).

The lack of a significant difference between the total battery scores of the youngest and the intermediate age groups (t ⫤ .89) suggests that a main shift in the attributes measured by the battery scores occurred during late childhood and early adolescence.

Further analysis of developmental trends (Table 4) revealed that

1. The older group performed significantly better on directionality tests than the younger group.
2. The older group performed significantly better on body part tests than the other two groups.
3. Attributes measured in the body plane and body part sections appear well developed in these children by the time they entered school; there were significant differences in these areas.

When could these children project themselves into another person's reference system? When could they make left-right judgments about themselves and about space? Analysis of test scores revealed that

1. Not until age nine could children in this sample make accurate left-right judgments more frequently than would be expected by chance.
2. Inability to project themselves within the experimenter's reference system to identify left and right body parts persisted into adolescence; for example, 75 percent of the ten-year-olds could not do this.

There was a low positive correlation (not significant) between IQ and age ($r = .23$). While the mean IQ of the older group (ages 13 to 16) was lower (82.17) than that of 5-to-12-year-old children (89.07), this difference was not significant (note the large standard deviations--13.29 and 22.02, respectively). This comparison was carried out because it might be presumed that children over the age of 12 might be the more severely retarded (at age 13, if a child is able, he is usually promoted to a special class in one of Los Angeles' two junior high schools for normal youngsters).

Developmental Sequences

We attempted to establish the relative order of difficulty of several classifications of tasks (Tables 6 to 10). Tasks within the subtests were classified within four groups: simple naming of body parts, left-right discriminations of all kinds, object-to-body relationships, and the perception of movements of various types. Table 7 indicates the order in which the younger group was able to identify body parts; we believed that greater insight might be obtained if a group of five-to-nine-year olds was surveyed in this respect (that is, the degree of difficulty between various subtasks might be pointed up).

Examination of these sequences led to the following generalizations:

1. Most subjects could identify their body planes, little fingers and thumbs, and extremities. More difficult was correct identification of left and right body parts and of the middle fingers, including the first finger. More difficult than some of the left-right judgments of body parts was the identification of some of the components of the limbs (for example wrist, thigh, upper arm, forearm, and so on), which were accurately identified only from 35 to 60 percent of the time.
2. The order of difficulty was the same for the total population and the younger subpopulation (see Table 7).

Table 6

Body Part Order: Total Subjects

Percent	*Body Parts*
98.9	Bottom of foot, hand, ear, nose, mouth
97.8	Top of head, back, eye, thumb
96.8	Arm
94.7	Knee and shoulder
93.6	Leg and middle finger
92.6	Little finger
90.5	Right knee
89.4	Side and front of body
86.3	Left and right foot
84.2	Right and left leg
82.2	Elbow
82.1	Left and right arm
78.9	Left and right ear
75.7	First (pointer) finger
63.1	Cheek
61.0	Ring finger and wrist
51.5	Forearm
50.8	Upperarm
35.0	Thigh

3. It was easier for blind children to remain fixed and to move objects in relationship to bodily planes (for example, "Place the box so that it touches your side"), than to move the body so that it formed various relationships with plane surfaces external to the body (for example, "Lay down on your side"). (See Table 8.) Placing objects to the left and to the right of the body correctly was more difficult than relating objects to body planes, but deciding upon object-to-left-right relationships was only slightly more difficult than making various left-right discriminations independent of any objects (for example, left-right hands, feet, and so forth). (See Tables 7 and 8.)

4. In general, it seemed easier for the children to identify their upper body parts and left-right dimensions than to make the same discriminations about lower body. Touching the left and right side of objects correctly was slightly more difficult than making left-right judgments about the body.

5. Movements of the entire body through space (for example "Move forward," and so on) seemed easier than reacting correctly to requests to make limb movements. (See Table 9.)

6. Judging the experimenter's movements via tactual inspection was more difficult for the children than making these movements themselves.

7. Whether the child was standing or lying seemed to make no difference in carrying out requested limb movements.

Table 7

Relative Order of Difficulty in Which 5-to-9-Year-Old Children Can Identify Body Parts

Percent	*Body Parts*
100	Face, nose, mouth, eye, top of head, bottom of foot
97.8	Thumb, arm, hand, leg
95.6	Back, front, shoulder
86.9	Side of body
82.0	Cheek
80.4	Left and right knees, left and right arms, left and right foot
78.2	Little finger
76.0	Left and right legs
73.0	Left and right ears
71.7	Middle finger
65.0	Ring finger
58.6	First (pointer) finger
56.1	Wrist
54.3	Forearm
47.8	Thigh and upper arm

8. Requests that the child move various parts of his body were executed more accurately than were requests to touch parts of the limbs. (See Tables 6 and 9.)

9. Making simple movements independent of left-right judgments was easier than deciding correctly which way was right and left; this, in turn, was easier than deciding when the tester was moving to his left or right.

10. Making various left-right judgments involving simple one-step directions (for example, "Touch your left ear") was far simpler than accurately reacting to two-step directions, left-right discriminations (for example, "With your left hand touch your right ear"). (See Table 10.)

11. Placing objects in correct left-right relationships to the body was more difficult than making various left-right discriminations of the body parts themselves; and, in turn, making correct object-to-left-right bodily discriminations was easier than reacting correctly to two-step directions involving left-right discriminations. (See Table 10.)

Summary of Findings

1. The responses of the blind population in this investigation were reliably assessed using the testing instrument employed (test/retest $r = .82$).

2. The score combining the body-part identification and left-right discrimination subscores was highly correlated with the score in the total test battery ($r = .92$).

Table 8

Order of Difficulty: Object-Body Relationships

Percent	*Relationship*
97.8.	Place box so it touches foot.
96.8	Place box so it touches back, head.
92.6	Place box so it touches front (stomach).
91.5	Place box so it touches side.
89.4	Move so back is touching mat (lying).
88.4	Move so back is touching mat (standing).
87.3	Lie so side touches mat.
86.3	Move so side is touching wall (standing).
85.2	Move so stomach is touching mat.
83.1	Hold box in left and right hand; touch right and left side of the box.
83.2	Place box near right and left foot.
81.0	Place box near right and left knee.
77.8	With left hand touch right side of box.
75.7	Place box so it touches right side; left and right hand touch left or right side of box.

Table 9

Order of Difficulty: Perception of Movements

Percent	*Movement*
98.9	Walk forward toward me, jump up.
97.8	Walk backward away from me.
96.8	Lift one arm high in the air.
95.7	Bend one knee (in back-lying position), bend knees and squat down, rise on toes.
94.7	Bend one arm at the elbow (lying and standing).
93.6	Bend to the side.
92.6	Move toward the other side.
91.5	Move to the side, bend your body away from me.
90.5	Straighten your arm.
88.4	Bend forward, toward me.
54.7	Judges whether tester is bending to right or left while holding shoulders.
47.3	Judges whether tester is moving right or left.

Table 10

Order of Difficulty: Left-Right Judgments

Percent	*Judgment*
90.5	Touch left and right knee.
86.3	Touch left and right foot.
84.2	Touch left and right leg.
83.1	Hold box in left and right hand.
82.1	Touch left and right arm, place box by left or right foot.
81.0	Place box so it touches left and right knee.
78.9	Touch left and right ear.
77.8	With left hand touch right hand.
76.8	With left hand touch right ear.
75.7	Place box so it touches left and right side; with right hand touch left elbow.
74.7	With right hand touch left knee.
61.0	With your left hand touch your right wrist.

3. The easiest tasks were those involving body plane identification and accurate execution of various movements involving the total body. Next in difficulty was body part identification; and most difficult were those in which subjects had to make left-right discriminations of themselves, of things, and of another person.

4. There were no significant sex differences. However, scores by children with IQs above 80, by the totally blind, and by the older children were generally superior to scores obtained by those with IQs below 80, the partially sighted, and the younger children.

5. A moderate relationship (exceeding $r = .40$) was obtained between IQs and total battery score; the relationship was more marked in the case of girls than when the boys' IQ scores were compared to their body-image scores.

6. Knowledge of body parts and of bodily planes was reasonably well developed, as was knowledge of left-right body discriminations; however, the children seemed totally incapable of projecting themselves into the tester's left-right reference system.

7. Laterality developed sometime around age nine in the blind children surveyed.

8. The blind seemed more capable of identifying parts of their face and limbs and making total bodily movements accurately, than making correct judgments relative to the left-right dimensions of their body. Next in order of difficulty was making accurate object-to-body relationships involving left-right discriminations; most difficult was projecting themselves into another's reference system, identifying limb components (wrist, thigh, forearm, upper arm, and so on), and discriminating differences between their middle three fingers.

Comparison of these findings with the data collected by Lord and his colleagues (49) suggests that

1. It is probable that the population used in this investigation was less stable emotionally than that employed by Lord. For example, he found that only 17 of the 123 children at the Frances Blend School were suitable as subjects--that is, evidenced freedom from motor, emotional, and mental difficulties.

2. The stable blind children used by Lord seemed to have gained an awareness of the left and right of their bodies, and of their world, at about age five, whereas the subjects used in this investigation were almost nine years old before they could accurately identify the right and left of things better than expected by chance.

3. Both populations were unable, better than chance, to correctly identify a tester's left and right body parts. While Lord's data indicated that the oldest children in his sample (12 years) were able to make this kind of judgment correctly about 65 percent of the time, unless 75 percent of the responses in a two-choice situation are correct it is usually concluded that it is not being made better than chance.

4. Both studies point to the fact that it is easier for a child to find his left and right body parts than to find these same directions in space. At the same time, both investigations indicate that certain left-right judgments are easier than ascertaining the location of some components of the body, including the neck, chest, elbow, and the like.

5. More exact comparisons could not be made between the data collected in the two experiments because different experimental protocols were employed. For example, Lord grouped several body parts under a single pass-fail score, with a "fail" being awarded if one or more of the body parts were not identified correctly. Thus it was impossible to ascertain just which body parts were being "missed."

5 EDUCATIONAL IMPLICATIONS

A Rationale for Body-image Training

Several workers have proposed body-image training programs. Critical to the formulation of a rationale are the definition of body-image that is proposed and the measures that have been utilized to evaluate the child's body-image. Many clinicians suggest that disorganized or imperfect movement attributes point to a deficit in body-image, and that therefore one should concentrate upon movement activities as training tasks (46). Others have taken a more restrictive view of body-image and seem to suggest that its development is signaled by a cognitive-verbal awareness of various body-parts, and so on. Their training programs thus rely more upon practice in verbal identification of body components (18).

Undoubtedly, a child's body-image begins developing before any adequate measure may be made of the extent to which he is acquiring precepts relative to his physical constitution. Children born without limbs are frequently fitted with appendages immediately after birth so that when they are able to cope with a usable prothesis they will have incorporated into their body schema something having similar size and weight at the appropriate place on their body, and later will not reject the mechanical aid strapped to the shoulder or hip.

We believe that while a comprehensive program of movement and manipulative activities should be begun as soon as is feasible with a blind child, one should also attempt to gain some exact measures of the extent to which the child's perceptions of himself seem to be developing as soon as such evidence may be obtained verbally. The blind child may begin to form a perception of his body not only by examining himself, but also by manipulating dolls, manually examining another person, talking about his body parts, and by modeling clay or constructing mannikins in the human form. Despite the early contributions of mental, verbal, and motor activities to the development of body-image, however, one should also attempt, when his mental-verbal age makes such questioning practicable, to assess the extent to which the child can name various body parts and make similar judgments. The authors did not use either clay modeling or mannikin building to evaluate body-image because such test measures are influenced by the child's artistic ability (the Draw-a-Person test is similarly biased).

One frequently voiced rationale for the development of body-image in sighted children is that these perceptions form a base from which the child can begin to structure space accurately (46). Kephart and others have suggested that the formation of a left-right orientation and the ability to integrate one side of his body with the other and to correctly identify his left and right hands all contribute to the child's ability to make similar discriminations in space. Thus, laterality is related to directionality.

Experimental evidence collected on sighted children by Ayers and by the senior author, however, indicates that no relationship exists between measures of directionality and measures of left-right discrimination of body parts (6, 23). This does not mean that training in body-image cannot contribute in a positive way to a child's perceptions of the dimensions of his spatial world. To expect a sighted child's visual perceptions to organize themselves suddenly simply because he salutes the flag with his correct hand is foolish. However, if transfer is correctly taught to sighted children ("Johnny, the D faces toward your right hand") by building "cognitive bridges" between the body and space, then body-image training should help in teaching the child, whether sighted or blind, more about his spatial world.*

It seems logical to assume that before we can expect the child to make any more sophisticated perceptual judgments he should know where he is, where his body parts are, the various dimensions of his body, the movement it can make, and its relationships to objects. However, this principle is sometimes overlooked by educators of the blind. It is not unusual to find a child prepared for college in every respect except in ability to find his way around the campus. Blind elementary-school children may become proficient in braille, and yet be very confused when they leave the classroom and attempt to find their way about the school.

In 1966/67, over an eight-week period, Peterson studied the training of blind children in dynamic spatial orientation. One of the tests involved both accurate facing movement and correct left-right judgment. When the child was asked to "Turn ninety degrees to your right" he had to turn the required amount as well as decide which way was "to the right" (60).

Some of the children who completed this training achieved more than increased accuracy in facing movements and in the attributes incorporated in the other tasks. Their teachers reported greater understanding of the concept of longitude and latitude, greater facility in finding their way about school, and a better grasp of various spatial problems with which the children were daily confronted.

Finding out about space is one of the critical problems for the blind person. The visual system can process exact information about space more efficiently than the other sensory modalities. A blind person's faulty perceptions of body and left-right dimensions may lead to inaccurate organization of the home, neighborhood, and school environment. Hence, it is believed that a sound rationale for teaching body-image to blind children is that their physical being is the "center platform" from which all spatial judgments originate. Tasks and techniques intended to improve awareness of the body, its parts, and its movement attributes are vital to educational programs for blind infants and children.

Training Sequences and Methods

To improve the functioning of individuals deprived of some component of their sensory-motor apparatus, the educator must employ the remaining sensory systems individually or in combination to best advantage. The deaf child must watch and palpate his teacher's lip movements; the child with cerebral palsy must watch and vicariously manipulate his environment to gain the precepts obtained by the normal child through direct interaction with objects and space; the blind must rely upon kinesthetic, tactual, and auditory information when forming concepts about themselves and their environment.

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*Ellis, summarizing important principles relative to the transfer of learning, makes the important point that bridges of understanding between two attributes must be constructed for optimum transfer to occur (29).

Naive adherents of some of the recently advanced perceptual-motor panaceas for the remediation of various learning disorders seem at times to ignore the role of a most important component of the human personality. Individuals working with blind children should not fall into a similar trap. For, while it is true that children manipulate with their hands, move with their bodies, see with their eyes, and pair vision with motion and motions of their hands with movements of their limbs and total bodies, *they also think with their brains*! Thus it is important, in considering some of the following training techniques, to remember that the value of such methods is directly related to the extent to which we encourage the child to think about what he is doing and why he is doing it, rather than simply to encourage movements without meaning and verbalizations without thought.

Important also when dealing with body-image is working with the "hand-image." An investigation recently completed in our laboratory resulted in a perfect positive correlation between a measure of the perception of the hands (that is, identifying which fingers are being touched when placed out of sight of the testee) and motor abilities of the hands (53). The data from this study suggest that, unlike sighted children who have an accurate awareness of most of their fingers by age five, the blind children seemed to grasp a general awareness that they have fingers on a hand and that at one end there is a first finger (a thumb) and at the other end a little finger. They seemed to have difficulty, however, when asked to differentiate between the names and locations of fingers between the two ends.

The data reviewed about normal children suggest that they become aware of the difference between the thumb and first finger at about age three or four, while the findings of this study showed that blind children are not able to make this kind of discrimination until several years later (42).

Training Sequences

Child development theorists often imply that the child must first learn all about his body and then move out into space. While this is, in general, what may occur, the data from our study seem to suggest certain modifications in the principle. The order of program components listed below is based on the percent of responses to various subtasks within the survey form utilized. The content of the listed components suggest objectives to be reached at successive stages of body-image training. Techniques for achieving these stages are discussed in the paragraphs that follow.

Phase I: Body Planes, Parts, and Movements. As the blind child begins to move and to verbalize, he should be helped to gain an awareness of his body's more gross aspects and its movement capacities, including:

1. the parts of his face (eye, ear, nose)
2. the planes of his body (top, bottom, side, front, back)
3. the placement of objects relative to the body planes as the child is fixed (for example, "Place the box to your front side, then back. Put the shoes on your feet. Put the hat on your head.")
4. the gross movement attributes of which the body is capable, including moving forward, backward, jumping up, and the like.

The attributes in Phase I may be developed between the ages of two and five years in blind children having normal intelligence. Prior to that time, of course, manipulative and locomotor activity should be encouraged in every way possible.

Phase II: *Left-Right Discrimination.* Next in order of difficulty, according to the data we collected, are perceptions related to various left-right body dimensions and body-plane-to-plane-surface relationships in which the body moves. Various limb movements may be encouraged in response to verbal directions, and also object-to-body relationships involving left-right discriminations:

1. identification of left and right hand, knee, foot, leg, ear, and so on
2. body-plane-to-plane-surface relationships—for example, "Turn so that your back is against the wall; Lie so that your side is nearest the mat."
3. object-to-body relationships involving left-right discriminations--for example, "Place the box near your right knee, your left side, your right leg."
4. the left and right of objects using the child's reference system—for example, "Touch the right side of the box, the left side of the table, the left side of the book, the right side of the braillewriter, the left side of the page."

Children with a mental age of five to seven should be able to perform tasks designed to instill these precepts.

Phase III: *Complex Judgments of the Body and of Body-Object Relationships.* Judgments relative to space in which the child must remember two separate but related directions are more difficult—for example, "Touch your left ear with your right hand." Similarly, some limb components are not well known until after the left and right of things and of the body are acquired. It also appears more difficult for the child to move his body so that its left or right is placed in relationship to various objects. For example, directions that are difficult for the child to follow, even after he has mastered the judgments in Phases I and II, include:

1. "Move so that your left side is nearest the wall. Lie down on your right side. Stand so that the box is near your left knee."
2. "Touch your right ear with your left hand, your left knee with your right hand," and so on.
3. "Where is your thigh, your upper arm, your elbow, and your shoulder?"
4. "Where are your middle fingers? What are they called? Which is your middle finger, your ring finger, your first or pointer finger?"

Children with a mental age of six to eight might be expected to react successfully to the directions contained in Phase III.

Phase IV: *Another Person's Reference System.* The fourth phase involves ability to project into another person's reference system. By age eight or nine a sighted child can determine the left and right parts of an individual facing him, but it is difficult for a blind child to "face" someone. Not surprisingly, the children in our investigation were for the most part unable to make this kind of differentiation accurately. Lowenfeld and Adato, among others, have found that when sculpturing the human form, the blind child will usually face in the same direction as the clay replica faces, rather than confront the statue as the sighted usually do when they are forming it (2, 50). The importance to the blind child of making these kinds of discriminations is uncertain. However, as a group these kinds of judgments are apparently difficult for the blind child to make. For example:

1. "I am looking at you. Now touch my shoulder and my face. Tell me which is the left and which is the right."

2. "Now hold my shoulders and tell me whether I am moving to the left or moving toward the right."

Training Methodologies

All available sensory input should be utilized in attempts to improve the blind child's body-image. Certain modalities are more appropriate than others at various ages, and for certain of the phases listed above. Most of the time it is helpful if two channels of input are used concurrently—for example, while a child is rolling slowly down a mat, he may be asked to report when he is touching his side, back, front, or left-side or right-side to the mat. This activity, of course, combines verbal and motor behavior. Body-image training should employ tasks that require the child to tactually inspect a human—another individual, his own body, or mannikins or dolls.

Movement attributes connected with life activities may be paired with verbal reports of left and right. Ilg and Ames reported that when sighted children were asked how they formulated their perceptions of left and right, they usually replied that this was accomplished by reminding themselves that they ate with their right hand, saluted the flag with their right hand, or brushed their teeth with their left hand (41).

Body-image training should involve a variety of tasks. The "translation" of training tasks into ingrained concepts is directly dependent upon the number of approaches taken to mastering the concept—for example, a child should be asked not only to identify his left and right hands, but also to make the several left-right body-to-object relationships suggested by the content of the survey form utilized in this study.

The following techniques were taken from several sources (16, 41, 49).

Tactual Experiences with the Body

Mat-Rolling. The child may roll (aided or unassisted) on a mat or other soft surface, with the body extended, in a ball, or with arms extended or flexed against his sides, and so on. If his verbal behavior is developed sufficiently, he may be asked to tell whether he is on his side, front, back, and so on as he rolls. If his mental age is above seven, he may be asked to tell when he is on his right or left side, or to roll to the left or right when directed to do so. Large canvas bags filled with pieces of foam rubber provide a good surface for this activity.

Wall-Sliding. The standing child may be asked to turn slowly while remaining in contact with a wall, and to verbalize as in mat-rolling.

Body-Stroking. The parent's hands may pass over the blind child's plane surfaces and body parts or the child may be encouraged to explore—and, if he can, identify—his own body parts.

Angels in the Snow. The child may be asked to lie on his back and to move his arms and legs in various combinations (both arms, both legs, one arm or leg, left arm and leg, and so forth) up and down along the mat at various speeds. The limbs should remain in contact with the mat and verbalization may or may not accompany the movements. Contact with the mat by the limbs purportedly heightens bodily awareness.

Manual-Verbal Activities

Manual Inspection of Simple Forms. Prior to the development of speech, a blind child should be given every opportunity to engage in manual inspection of spheres, cubes, and the like.

Manual Inspection of Complex Forms. As speech develops, the child should be given common objects to handle and to identify.

Manual Inspection and Manipulation of the Human Form. At about age two the child should be given the opportunity to manually inspect dolls, asked to identify their parts, and encouraged to grasp the concept of scale—that is, the idea that the doll's parts and total body correspond to his own and to others in his family.

Manual Construction of the Human Form. By age five the blind child should be encouraged to model clay into the shape of the human form—head and face or the whole body.

Complex Manual Activities. These tasks may include bilateral identification of simple and complex forms--for example, while holding a shape in one hand, the child may be requested to select among various shapes with the other hand and to find a corresponding shape. While touching his own body part or that of his parent with one hand, the child may be asked to identify a similar body part on his parent or on a doll held in his other hand. The blind child may be given a doll "family" which corresponds in sex, size, and number to his own, so that he will gain a better grasp of the manner in which people's bodies differ in size and shape.

Judgments that involve the manual inspection and discrimination of shape and form are an important component of the early education of a blind child.

Movement Activities

Innumerable activities involving movement of the whole body and/or its parts should be incorporated into programs for blind children; not only are they made aware of their bodies through such activities, but at the same time participation in vigorous muscular tasks will heighten important physical capacities and strengthen body frames.

Obstacle Courses. Courses composed of things to crawl through and move over and under will give a blind child a more accurate awareness of his body's size. Boxes, benches, and the like may be used in such activities.

Trampolining. Carefully supervised trampolining has been recommended for heightening a number of perceptual-motor attributes of sighted children and has been used with success by teachers of the blind. As the child sits, it might be hypothesized, he gains a more accurate awareness of the relative size of his body segments.

Rhythmics. Rhythmical activities traditionally have been an effective means of aiding blind children to gain a better awareness of their body's capabilities for movements.

Word Games. In a very direct way, word games may be used to train children to respond correctly to directions similar to those contained in the survey form in the Appendix. "Simon Says," and similar activities, are effective. Care must be taken, however, to determine when a child simply becomes able to play the game well (for example, to identify his left and right hand) and when he truly becomes capable of conceptualizing about the "left" and "right" of things. Some children will be remarkably able to make correct verbal responses to some body-image tasks (for example, touch your cheek) and yet have no real awareness of what the request means.

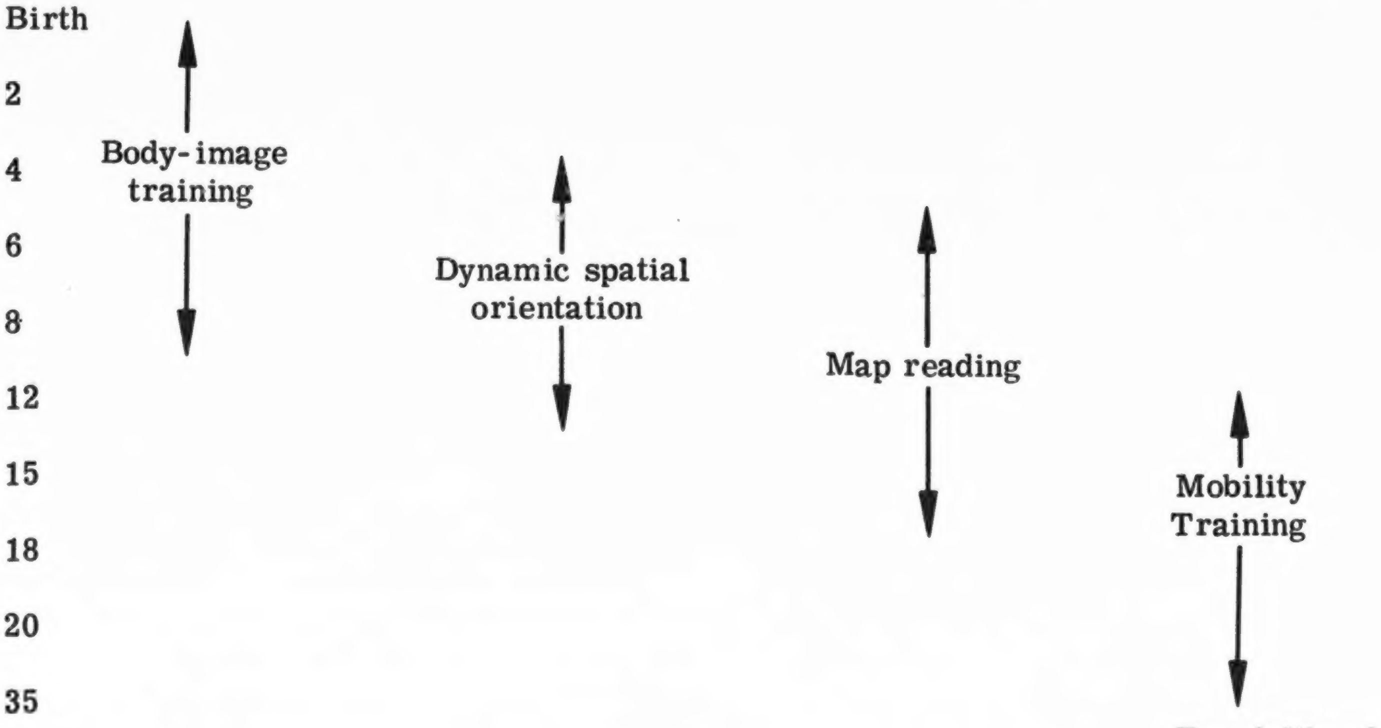
Summary of Training Methodologies

The preceding are examples of only some of the many ways in which a blind child's body-image may be enhanced. It should be noted that most of those outlined are not specific to one sensory modality, but combine verbal, tactual, and movement behaviors in varying ways. Further study is needed to determine which training techniques are most effective. An investigation of this nature is presently under way; it involves the influence of the use of rhythmics and dance upon the scores obtained in the survey form used in this investigation.

An Overview: The "Spatial" Education of Blind Children

It is believed that further investigation will make it apparent that blind children must be taught in a rather organized way about space. Von Senden asserts that the blind cannot truly learn about space through the other sensory modalities; contemporary studies seem to indicate otherwise (71). Dr. Alfred Leonard, for example, has taught school-age boys to interpret maps and to find their way without assistance around villages in England (48).

Components of such a program might include: (a) body-image training (involving the activities listed earlier in this chapter); (b) training in more dynamic spatial orientations (including facing movements, walking straight, relocation of a position in space), accompanied by training in the use of auditory cues (as suggested by our data and by training procedures developed by the Schilling Foundation); and (c) mobility training in which the basic attributes are employed, together with correct cane and/or dog traveling techniques, which enable the blind adolescent to travel through his near and distant environments with a minimum of stress and effort. Application of these components probably should not be introduced at discrete times within the life of the child, but should overlap to some degree, perhaps as follows:



The above guidelines are, of course, only tentative. With the completion of more investigations similar to those suggested in the final chapter, more exact recommendations could be made.

6 SUMMARY, CONCLUSIONS, AND IMPLICATIONS

A body-image survey form was administered to 91 children at the Frances Blend School for the Blind in Los Angeles, California. Test items were developed after a survey of the literature and practice with similar forms administered to retarded, neurologically handicapped, and blind children. The five-part survey form included verbal requests to identify planes of the body (front, back, and so forth) and body parts. Accuracy was also scored for responses to requests to make accurate movements of the body, to discriminate between left-right dimensions of the body, and to discriminate between the left and right of the tester and of objects.

The mean age of the population was 10.06 years; all but one had been blind from birth. Seventy-three of the children were partially sighted, while 18 were totally blind. The IQs of the 59 subjects for whom this measure was available ranged from 57 to 144, with a mean of 88.32. Eighteen of the children were tested twice and the test/retest scores on the total battery, when correlated, revealed that the test was reliable ($r = .82$).

Analysis of mean scores on subtests suggested that the first three sections were easiest (Body Parts, Body Movements, and Body Planes) and the last two sections more difficult; scores on the Directionality section were significantly lower than scores on the Laterality section, in which various left-right discriminations were required.

Further analysis of the data revealed that:

1. A score combining the subscores from the body-part and laterality sections was highly predictive of the total battery score ($r = .92$).
2. No significant sex differences were obtained. However, scores achieved by the children with IQs above 80, by the totally blind, and by the older children (ages 13 to 16) were generally superior to scores achieved by children with IQs of 79 and less, by the partially sighted, and by younger children under the age of twelve.
3. A moderate relationship was obtained between IQ and the total test battery score ($r = .40$).
4. While the total population was aware of body parts and the left-right discriminations required, they were totally incapable of projecting themselves into the tester's reference system (for example, naming another's left and right hand).

On the basis of these findings, it was concluded that

1. Blind children's abilities to make accurate identifications of their body parts and to make other discriminations relative to the body-image may be reliably assessed.

2. This type of investigation reveals significant intragroup differences, and the relative order of difficulty, in the various subtasks required; both differences have significant educational implications.

Implications of the Findings

Theoretical Implications

If it is accepted that certain body-object relationships are comprehended before the child can make complex judgments about the more elusive body parts, it follows that some adjustment should be made in child-development theory dealing with the normal child.

The blind child's apparent inability to project himself into another person's reference system has interesting implications. For example, what does the young blind child first perceive about other people? Are they bodies as the sighted perceive of them? Probably not. Others are perhaps simply voices, accompanied by an occasional touch of a hand or of a body surface. The concept of another individual's body-image is perhaps even more elusive than is a blind child's own body-image.

The manner in which a child blind since birth perceives space is a problem which has plagued educators for years. A recent conversation with a man who had first gained sight at the age of 19 revealed that he did not know what space was prior to gaining vision. He reported climbing without concern to great heights along precipitous beams when he was a child; a "fall" would have been a spatial, and thus a sighted, concept—and he did not know what "space" meant.

For the blind to gain any insight into the nature of space, it is believed that they must be led through tasks that are carefully sequenced and accompanied by explicit instruction. To leave such training to chance is not only a disservice, but may have deleterious effects on person and personality. This study argues for the feasibility of constructing a training sequence of this nature.

Practical Implications

Several practical implications related to the education of the blind were suggested in Chapter 5. Good education begins first by establishing reasonable goals to be attained by students. We also believe that prior to instituting any program of education, two steps must be taken: *(1)* One must survey the extent to which the population to be educated possesses the attribute and/or the potential to learn the attribute taught; *(2)* Study must then be carried out to determine the best ways to achieve expertise in the tasks in which proficiency is desired. We believe the present study demonstrates the practicality of carrying out this initial step with blind children. Further studies (one of which is currently in progress) should be undertaken to determine the best methods to teach body-image. Further studies on the matter of the teachability of body-image are described briefly below.

Implications for Further Study

It is apparent that a short version of the survey form (Appendix B) will serve for further studies. It is also apparent that validation of the scores obtained on the survey form might be made by comparison with the proficiency demonstrated by blind children in construction of three-dimensional mannikins, and in tasks involving the modeling of the human form in clay or similar material.

Studies of scores obtained from blind children on body-cathexis tests, similar to that developed by Secord, would be interesting (67). Further, one might compare responses by the blind on a body-image test with scores obtained from sighted children of comparable mental and chronological age.

There is a pressing need to establish tests that provide valid indices of the blind younger child's body-image. Perhaps the mannikin-construction test might prove useful. Similarly, the survey form used in the present study requires normative data derived from a larger and more typical group of blind children whose other characteristics (mental, emotional, and neurological) are more exactly defined. Further, the relationship between body scores and other measures of human personality might afford valuable insight into the educational problems of special educators trying to work with blind children.

Our findings and our observations of the behavior of the children sampled suggest innumerable training studies. One, designed to determine the influence of a program of dance and rhythm upon the quality of responses to our survey form, is under way. Studies of the effect of verbal, tactual, movement, and similar tasks on the attributes evaluated here should prove worthwhile.

Research on the effects of accurate left-right discrimination on facility at reading and writing braille, and on orientation ability and navigational ability, in familiar and unfamiliar environments, might prove helpful to mobility trainers. The exact dimensions of a program of premobility training could result from such a study. The relationships between laterality and directionality in blind children have yet to be explained.

The primary contribution of the present study was to demonstrate the feasibility of evaluating an attribute important to the education of blind children. It is hoped that other workers will attempt to refine and modify the instruments used, and will send data collected to the authors so that norms may be established. Comments concerning the entire report are also solicited.

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Appendix A

ADDITIONAL DATA

Table 11

Raw Scores

Subject	*Age*	*Sex*	*IQ*	*Degree*	*I: Body Planes*	*II: Body Parts*	*III: Body Movements*	*IV: Laterality*	*V: Directionality*	*Total Score*
1	5	F	—	LV[a]	15	18	15	15	7	70
2	5	F	101	LV	15	16	15	9	9	64
3	5	M	80	LV	15	15	15	0	0	45
4	5	M	123	LV	15	15	15	1	2	48
5	6	F	114	LV	15	15	15	15	5	65
6	6	F	—	LV	15	16	16	13	5	64
7	6	F	132	TB[b]	15	20	15	15	15	80
8	6	F	83	TB	15	15	15	15	7	67
9	6	M	--	LV	15	18	15	15	14	77
10	6	M	--	LV	15	16	15	6	3	55
11	6	M	--	LV	15	16	15	4	6	56
12	6	M	--	LV	10	17	14	3	7	51
13	7	F	105	LV	15	16	15	13	7	66
14	7	F	97	LV	15	19	15	15	5	69
15	7	F	--	LV	9	16	15	6	9	55
16	7	F	--	LV	14	15	15	0	5	49
17	7	F	--	LV	8	13	15	9	10	55
18	7	F	116	TB	15	20	15	15	6	71
19	7	M	100	LV	15	13	15	14	8	65
20	7	M	--	LV	8	11	15	4	3	41
21	7	M	—	TB	15	19	15	15	14	78
22	8	F	97	LV	15	19	15	15	8	72
23	8	F	120	LV	15	20	15	15	15	80
24	8	F	68	LV	15	12	14	13	4	58
25	8	F	80	LV	15	17	15	14	14	75
26	8	F	--	LV	14	17	14	7	13	65
27	8	M	--	LV	8	8	12	4	1	33
28	8	M	--	LV	14	16	12	6	3	51
29	8	M	67	LV	15	14	15	15	5	64
30	8	M	81	LV	15	17	15	15	6	68

[a] LV: partially blind.
[b] TB: totally blind.

Table 11 (cont.)

Subject	Age	Sex	IQ	Degree	I Body Planes	II Body Parts	III Body Movements	IV Laterality	V Directionality	Total Score
31	8	M	72	LV	15	14	15	12	2	58
32	8	M	70	LV	11	16	15	8	6	56
33	8	M	—	TB	15	17	11	10	7	60
34	9	F	77	LV	15	19	15	15	15	79
35	9	F	99	LV	14	18	15	14	8	68
36	9	F	—	LV	15	17	15	15	6	68
37	9	F	73	LV	14	13	15	15	14	71
38	9	M	—	LV	15	14	15	14	7	65
39	9	M	—	LV	15	19	15	15	6	70
40	9	M	85	LV	15	16	15	14	14	74
41	9	M	67	LV	12	12	13	13	9	59
42	9	M	88	LV	15	17	15	15	7	69
43	9	M	91	LV	15	16	15	13	15	74
44	9	M	119	LV	15	18	15	15	15	78
45	9	M	106	TB	15	19	15	15	11	75
46	9	M	108	TB	15	18	15	15	15	78
47	9	M	136	TB	15	20	15	15	15	80
48	10	M	107	LV	15	18	15	15	13	76
49	10	M	—	LV	15	14	15	13	8	65
50	10	M	76	LV	12	15	12	14	12	65
51	10	M	62	LV	15	14	15	12	9	65
52	10	M	—	LV	11	13	15	8	5	52
53	10	M	72	LV	15	14	15	1	13	55
54	10	M	112	TB	15	19	15	15	7	71
55	10	F	—	LV	15	14	13	12	8	62
56	10	F	55	LV	15	13	15	14	5	62
57	10	F	92	LV	15	20	15	15	5	70
58	10	F	66	LV	14	13	13	8	1	50
59	10	F	—	TB	12	19	14	12	7	64
60	11	M	144	LV	15	20	15	15	15	80

Table 11 (cont.)

Subject	Age	Sex	IQ	Degree	I Body Planes	II Body Parts	III Body Movements	IV Laterality	V Directionality	Total Score
61	11	M	57	LV	15	15	15	14	15	74
62	11	M	66	LV	15	16	15	14	5	65
63	11	M	79	TB	15	18	15	8	7	53
64	11	M	83	TB	15	16	15	14	7	67
65	11	M	—	LV	15	17	14	11	9	66
66	11	F	71	LV	15	16	15	15	15	76
67	11	F	90	LV	15	16	15	15	7	68
68	11	F	116	TB	15	20	15	15	15	80
69	11	F	113	TB	15	20	15	15	15	80
70	12	M	—	LV	15	17	15	10	12	69
71	12	M	77	LV	15	14	15	14	6	64
72	12	M	75	LV	15	16	15	15	6	67
73	12	M	74	LV	15	16	15	15	15	76
74	12	F	59	LV	13	14	12	8	13	60
75	12	F	—	LV	12	14	15	9	8	59
76	12	F	65	LV	15	17	15	13	8	68
77	12	F	66	TB	15	17	15	15	7	69
78	13	M	90	LV	15	20	15	15	15	80
79	13	M	96	LV	12	19	15	15	10	74
80	13	M	62	LV	15	17	15	15	7	69
81	13	M	91	TB	15	18	15	15	15	78
82	13	F	—	LV	14	19	14	15	7	69
83	13	F	—	LV	11	17	15	14	15	72
84	14	M	—	LV	12	18	12	13	8	63
85	14	M	98	LV	15	20	15	15	15	80
86	14	M	—	TB	15	20	15	15	14	79
87	14	F	—	LV	13	14	14	11	9	61
88	14	F	72	TB	15	19	15	15	5	69
89	15	F	70	LV	15	19	15	15	15	79
90	15	F	—	LV	15	18	15	14	11	73
91	16	F	—	LV	15	16	15	15	12	73

Table 12

Percent of Correct Responses: Female

Test Question[a]	*Group I*[b]	*Group II*[b]	*Group III*[b]		*Group I*	*Group II*	*Group III*
1. a.	100.0	92.8	100.0	9. a.	100.0	100.0	100.0
b.	100.0	92.8	100.0	b.	100.0	100.0	100.0
c.	85.7	92.8	87.5	c.	100.0	100.0	100.0
d.	95.2	100.0	87.5	d.	100.0	85.7	87.5
e.	95.2	100.0	100.0	e.	100.0	85.7	87.5
2. a.	85.7	85.7	75.0	10. a.	90.4	92.8	100.0
b.	90.4	71.4	75.0	b.	100.0	100.0	100.0
c.	95.2	85.7	62.5	c.	100.0	92.8	100.0
d.	90.4	78.5	87.5	d.	100.0	92.8	100.0
e.	90.4	85.7	87.5	e.	100.0	92.8	100.0
3. a.	90.4	92.8	87.5	11. a.	85.7	85.7	100.0
b.	90.4	85.7	100.0	b.	85.7	78.6	100.0
c.	95.2	92.8	100.0	c.	71.4	85.7	100.0
d.	95.2	100.0	100.0	d.	80.9	78.6	100.0
e.	100.0	92.8	100.0	e.	80.9	85.7	100.0
4. a.	100.0	92.8	100.0	12. a.	76.1	71.4	87.5
b.	100.0	92.8	100.0	b.	80.9	78.6	87.5
c.	95.2	92.8	100.0	c.	85.7	78.6	100.0
d.	80.9	92.8	100.0	d.	90.4	85.7	100.0
e.	95.2	92.8	87.5	e.	90.4	85.7	100.0
5. a.	100.0	100.0	100.0	13. a.	85.7	78.6	75.0
b.	100.0	100.0	100.0	b.	90.4	85.7	75.0
c.	100.0	100.0	100.0	c.	85.7	78.6	87.5
d.	100.0	100.0	100.0	d.	76.1	78.6	87.5
e.	71.4	71.4	75.0	e.	71.4	50.0	75.0
6. a.	57.1	57.1	75.0	14. a.	33.3	42.8	62.5
b.	47.6	28.5	12.5	b.	33.3	28.5	50.0
c.	52.3	50.0	50.0	c.	38.0	28.5	37.5
d.	52.3	42.8	75.0	d.	42.8	35.7	62.5
e.	95.2	85.7	75.0	e.	47.6	28.5	50.0
7. a.	100.0	85.7	100.0	15. a.	76.1	92.8	87.5
b.	47.6	57.1	87.5	b.	80.9	92.8	87.5
c.	52.3	85.7	87.5	c.	76.1	78.6	87.5
d.	52.3	85.7	87.5	d.	80.9	85.7	87.5
e.	95.2	64.2	75.0	e.	80.9	71.4	87.5
8. a.	100.0	71.4	87.5	16. a.	61.9	35.7	75.0
b.	95.2	85.7	62.5	b.	57.1	42.8	75.0
c.	100.0	85.7	87.5	c.	52.3	64.2	25.0
d.	100.0	100.0	87.5	d.	57.1	57.1	25.0
e.	100.0	100.0	87.5	e.	57.1	28.5	25.0

[a] For explanation of test question see Appendix B.

[b] Group I: ages 5 to 9.
Group II: ages 10 to 12.
Group III: ages 13 to 17.

Table 13

Percent of Correct Responses: Male

Test Question[a]	*Group I*[b]	*Group II*[b]	*Group III*[b]		*Group I*	*Group II*	*Group III*
1. a.	100.0	94.7	100.0	9. a.	100.0	94.7	100.0
b.	100.0	100.0	100.0	b.	100.0	89.4	100.0
c.	88.0	89.4	100.0	c.	100.0	94.7	100.0
d.	92.0	100.0	87.5	d.	88.0	89.4	100.0
e.	96.0	100.0	100.0	e.	88.0	89.4	100.0
2. a.	84.0	94.7	100.0	10. a.	100.0	94.7	87.5
b.	84.0	94.7	87.5	b.	100.0	89.4	87.5
c.	88.0	94.7	100.0	c.	100.0	89.4	87.5
d.	80.0	89.4	100.0	d.	100.0	89.4	75.0
e.	80.0	94.7	100.0	e.	100.0	89.4	75.0
3. a.	96.0	84.2	100.0	11. a.	76.0	89.4	87.5
b.	96.0	89.4	100.0	b.	76.0	89.4	87.5
c.	100.0	94.7	100.0	c.	80.0	89.4	87.5
d.	100.0	94.7	87.5	d.	80.0	94.7	87.5
e.	100.0	100.0	100.0	e.	68.0	94.7	87.5
4. a.	96.0	94.7	100.0	12. a.	76.0	68.4	87.5
b.	100.0	100.0	100.0	b.	80.0	78.9	87.5
c.	84.0	100.0	100.0	c.	76.0	84.2	87.5
d.	80.0	78.9	100.0	d.	80.0	78.9	87.5
e.	84.0	84.2	100.0	e.	76.0	73.6	87.5
5. a.	100.0	94.7	100.0	13. a.	76.0	73.6	75.0
b.	100.0	94.7	100.0	b.	60.0	68.4	75.0
c.	100.0	94.7	100.0	c.	60.0	78.9	87.5
d.	96.0	94.7	100.0	d.	72.0	68.4	87.5
e.	92.0	47.3	87.5	e.	56.0	47.3	87.5
6. a.	60.0	47.3	100.0	14. a.	48.0	36.8	62.5
b.	48.0	15.7	50.0	b.	52.0	42.1	50.0
c.	56.0	36.8	75.0	c.	36.0	47.3	50.0
d.	44.0	47.3	62.5	d.	36.0	52.6	50.0
e.	92.0	89.4	100.0	e.	40.0	52.6	62.5
7. a.	96.0	100.0	100.0	15. a.	68.0	84.2	87.5
b.	68.0	68.4	87.5	b.	72.0	84.2	87.5
c.	100.0	89.4	100.0	c.	60.0	68.4	87.5
d.	88.0	94.7	87.5	d.	64.0	68.4	87.5
e.	40.0	52.6	87.5	e.	72.0	68.4	87.5
8. a.	92.0	94.7	100.0	16. a.	48.0	52.6	62.5
b.	92.0	89.4	87.5	b.	52.0	52.6	62.5
c.	100.0	89.4	100.0	c.	44.0	57.8	87.5
d.	92.0	94.7	100.0	d.	48.0	57.8	75.0
e.	96.0	89.4	100.0	e.	52.0	52.6	50.0

[a] For explanation of test question see Appendix B.

[b] Group I: ages 5 to 9.
Group II: ages 10 to 12.
Group III: ages 13 to 17.

Table 14

Percent of Correct Responses: Total Group

Test Question[a]	*Male* (N = 52)	*Female* (N = 43)		*Male*	*Female*
1. a.	98.0	97.6	9. a.	98.0	100.0
b.	100.0	97.6	b.	96.1	100.0
c.	90.3	88.3	c.	98.0	100.0
d.	84.6	95.3	d.	90.3	93.0
e.	98.0	97.6	e.	92.3	93.0
2. a.	90.3	83.7	10. a.	96.1	93.0
b.	88.4	81.3	b.	94.2	100.0
c.	92.3	86.0	c.	94.2	97.6
d.	86.5	36.0	d.	92.3	97.6
e.	88.4	88.3	e.	92.3	97.6
3. a.	92.3	90.6	11. a.	82.1	88.3
b.	94.2	90.6	b.	82.1	86.0
c.	98.0	95.3	c.	84.6	81.3
d.	96.1	97.6	d.	86.5	83.7
e.	100.0	95.3	e.	80.7	86.0
4. a.	96.1	97.6	12. a.	75.0	76.7
b.	100.0	97.6	b.	80.7	81.3
c.	92.3	95.3	c.	80.7	72.0
d.	82.6	88.3	d.	80.7	90.6
e.	96.1	93.0	e.	76.9	90.6
5. a.	98.0	100.0	13. a.	75.0	81.3
b.	98.0	100.0	b.	65.3	86.0
c.	98.0	100.0	c.	71.1	83.7
d.	96.1	100.0	d.	73.0	79.0
e.	55.7	72.0	e.	57.6	65.1
6. a.	61.5	60.4	14. a.	46.1	41.8
b.	36.5	34.8	b.	48.0	34.8
c.	51.9	51.1	c.	40.3	37.2
d.	48.0	53.4	d.	44.2	44.1
e.	100.0	88.3	e.	48.0	41.8
7. a.	100.0	95.3	15. a.	75.0	83.7
b.	80.7	69.7	b.	80.7	86.0
c.	96.1	88.3	c.	76.9	79.0
d.	100.0	90.6	d.	69.2	83.7
e.	51.9	72.0	e.	73.0	79.0
8. a.	94.2	88.3	16. a.	51.9	55.8
b.	90.3	86.0	b.	53.8	55.8
c.	96.1	90.6	c.	55.7	51.1
d.	94.2	97.6	d.	55.7	51.1
e.	94.2	97.6	e.	51.9	41.8

[a] For explanation of test question see Appendix B

Table 15

Percent of Correct Responses: Male and Female (5 to 9 years)

Test Question[a]					
1.	a.	100.0	9.	a.	100.0
	b.	100.0		b.	100.0
	c.	86.9		c.	100.0
	d.	93.4		d.	93.4
	e.	95.6		e.	93.4
2.	a.	84.7	10.	a.	95.6
	b.	86.9		b.	100.0
	c.	91.3		c.	100.0
	d.	84.7		d.	100.0
	e.	84.7		e.	100.0
3.	a.	93.4	11.	a.	80.4
	b.	93.4		b.	80.4
	c.	97.8		c.	76.0
	d.	97.8		d.	80.4
	e.	100.0		e.	73.9
4.	a.	97.8	12.	a.	76.0
	b.	97.8		b.	80.4
	c.	89.1		c.	80.4
	d.	80.4		d.	84.7
	e.	89.1		e.	82.6
5.	a.	100.0	13.	a.	80.4
	b.	100.0		b.	73.9
	c.	100.0		c.	71.7
	d.	100.0		d.	73.9
	e.	82.6		e.	63.0
6.	a.	56.1	14.	a.	41.3
	b.	47.8		b.	43.4
	c.	54.3		c.	36.9
	d.	47.8		d.	39.1
	e.	93.4		e.	43.4
7.	a.	97.8	15.	a.	71.7
	b.	58.6		b.	76.0
	c.	78.2		c.	67.3
	d.	71.7		d.	71.7
	e.	65.2		e.	76.0
8.	a.	95.6	16.	a.	54.3
	b.	93.4		b.	54.3
	c.	100.0		c.	47.8
	d.	95.6		d.	52.1
	e.	97.8		e.	54.3

[a] For explanation of test questions see Appendix B.

Table 16

Percent of Correct Responses of Total Group: Totally and Partially Blind

Test Question[a]	Totally Blind	Partially Blind	Test Question[a]	Totally Blind	Partially Blind
1. a.	100.0	97.3	9. a.	89.4	100.0
b.	100.0	98.6	b.	89.4	98.6
c.	89.4	94.7	c.	84.2	100.0
d.	94.7	94.7	d.	78.9	94.7
e.	100.0	98.6	e.	78.9	93.4
2. a.	94.7	88.1	10. a.	94.7	98.6
b.	89.4	85.5	b.	94.7	98.6
c.	89.4	92.1	c.	94.7	98.6
d.	94.7	86.8	d.	94.7	97.3
e.	100.0	84.2	e.	94.7	97.3
3. a.	89.4	94.7	11. a.	94.7	85.5
b.	94.7	94.7	b.	84.2	78.9
c.	100.0	97.3	c.	94.7	76.3
d.	100.0	94.7	d.	94.7	82.8
e.	100.0	98.6	e.	89.4	80.2
4. a.	94.7	98.6	12. a.	78.9	75.0
b.	100.0	100.0	b.	89.4	80.2
c.	100.0	92.1	c.	94.7	82.8
d.	100.0	85.5	d.	89.4	100.0
e.	100.0	88.1	e.	89.4	81.5
5. a.	94.7	98.6	13. a.	89.4	80.2
b.	94.7	97.3	b.	73.6	77.6
c.	94.7	98.6	c.	73.6	81.5
d.	94.7	97.3	d.	78.9	75.0
e.	78.9	64.4	e.	84.2	53.9
6. a.	84.2	57.8	14. a.	52.6	42.1
b.	42.1	32.8	b.	47.3	42.1
c.	63.1	51.3	c.	52.6	39.4
d.	78.9	46.0	d.	52.6	46.0
e.	89.4	93.4	e.	52.6	43.4
7. a.	100.0	94.7	15. a.	89.4	81.5
b.	78.9	64.4	b.	89.4	81.5
c.	94.7	93.4	c.	78.9	71.0
d.	100.0	80.2	d.	78.9	75.0
e.	84.2	53.9	e.	78.9	77.6
8. a.	84.2	96.0	16. a.	52.6	59.2
b.	84.2	92.1	b.	52.6	56.5
c.	89.4	96.0	c.	78.9	50.0
d.	84.2	97.3	d.	73.6	51.3
e.	89.4	96.0	e.	26.3	51.3

[a] For explanation of test question see Appendix B.

Table 17

Percent of Correct Responses: Total Group

Test Question[a]					
1.	a.	97.8	9.	a.	98.9
	b.	98.9		b.	97.8
	c.	89.4		c.	98.9
	d.	89.4		d.	91.5
	e.	97.8		e.	92.6
2.	a.	87.3	10.	a.	94.7
	b.	85.2		b.	96.8
	c.	89.4		c.	95.7
	d.	86.3		d.	94.7
	e.	88.4		e.	90.5
3.	a.	91.5	11.	a.	90.5
	b.	92.6		b.	82.1
	c.	96.8		c.	84.2
	d.	96.8		d.	86.3
	e.	97.8		e.	78.9
4.	a.	96.8	12.	a.	75.7
	b.	98.9		b.	81.0
	c.	93.6		c.	83.1
	d.	82.2		d.	82.2
	e.	94.7		e.	83.1
5.	a.	98.9	13.	a.	77.8
	b.	98.9		b.	74.7
	c.	98.9		c.	76.8
	d.	97.8		d.	75.7
	e.	63.1		e.	61.0
6.	a.	61.0	14.	a.	44.2
	b.	35.7		b.	42.1
	c.	51.5		c.	38.9
	d.	50.5		d.	44.2
	e.	94.7		e.	45.2
7.	a.	97.8	15.	a.	78.9
	b.	75.7		b.	83.1
	c.	92.6		c.	77.8
	d.	93.6		d.	75.7
	e.	61.0		e.	75.7
8.	a.	91.5	16.	a.	53.6
	b.	88.4		b.	54.7
	c.	93.6		c.	53.6
	d.	95.7		d.	53.6
	e.	95.7		e.	47.3

[a] For explanation of test question see Appendix B.

Table 18

Percent of Correct Responses of Total Group: IQ 80 and Above and 79 and Below

Test Question[a]	IQ 80+	IQ 79-
1. a.	100.0	100.0
b.	100.0	100.0
c.	100.0	100.0
d.	100.0	95.8
e.	100.0	100.0
2. a.	100.0	87.5
b.	100.0	83.3
c.	100.0	91.6
d.	100.0	83.3
e.	100.0	91.6
3. a.	100.0	95.8
b.	100.0	95.8
c.	100.0	95.8
d.	100.0	95.8
e.	100.0	95.8
4. a.	100.0	95.8
b.	100.0	95.8
c.	100.0	91.6
d.	93.9	91.6
e.	100.0	87.5
5. a.	100.0	100.0
b.	100.0	100.0
c.	100.0	100.0
d.	100.0	100.0
e.	84.8	100.0
6. a.	90.9	54.1
b.	48.4	4.1
c.	57.5	37.5
d.	63.6	29.1
e.	93.9	95.8
7. a.	96.9	95.8
b.	81.8	70.8
c.	96.9	95.8
d.	93.9	95.8
e.	66.6	62.5
8. a.	96.9	87.5
b.	96.9	87.5
c.	96.9	91.6
d.	96.9	100.0
e.	96.9	100.0
9. a.	100.0	91.6
b.	100.0	91.6
c.	100.0	91.6
d.	100.0	91.6
e.	100.0	91.6
10. a.	100.0	91.6
b.	100.0	95.8
c.	100.0	91.6
d.	100.0	91.6
e.	100.0	91.6
11. a.	96.9	91.6
b.	96.9	83.3
c.	90.9	83.3
d.	93.9	91.6
e.	96.9	91.6
12. a.	96.9	79.1
b.	96.9	83.3
c.	96.9	79.1
d.	96.9	83.3
e.	96.9	79.1
13. a.	93.9	79.1
b.	93.9	75.0
c.	90.9	83.3
d.	93.9	83.3
e.	90.9	50.0
14. a.	54.5	54.1
b.	51.5	50.0
c.	48.4	45.8
d.	48.4	45.8
e.	51.5	54.1
15. a.	93.9	95.8
b.	93.9	95.8
c.	93.9	75.0
d.	96.9	83.3
e.	100.0	66.6
16. a.	69.6	58.3
b.	69.6	54.1
c.	75.7	41.6
d.	75.7	41.6
e.	60.6	41.6

[a] For explanation of test question see Appendix B.

Table 19

Order of Difficulty of Totally and Partially Blind: Male and Female (ages 5 to 9)

Order	*Percent*	*Test Item*	*Section*
1	99.12	10	III. Body Movements—limb
2	97.36	9	III. Body Movements—gross relation to body plane
3	96.52	5	II. Body Parts—face
4/5	96.48	3	I. Body Planes—relation to objects
4/5	96.48	8	III. Body Movements—trunk while fixed
6	95.18	1	I. Body Planes—identification
7	90.84	4	II. Body Parts—identification: simple
8	86.46	2	I. Body Planes—relation of external horizontal-vertical surfaces
9	80.82	12	IV. Laterality—relation to objects
10	78.22	11	IV. Laterality—simple directions
11	74.30	7	II. Body Parts--hands, fingers
12	72.58	13	IV. Laterality—complex directions
13	72.54	15	V. Directionality—left and right of objects
14	59.88	6	II. Body Parts—complex (limb parts)
15	52.56	16	V. Directionality—others' movement
16	40.82	14	V. Directionality—other people

Table 20

Percent of Correct Responses of Total Group in Each Test Section

Order	*Percent*	*Test Item*	*Section*
1	95.94	9	III. Body Movements—gross relation to body plane
2	95.10	3	I. Body Planes—relation to objects
3	94.66	1	I. Body Planes-identification
4	94.48	10	III. Body Movements—limbs
5	93.24	4	II. Body Parts—identification: simple
6	92.98	8	III. Body Movements—trunk fixed
7	91.52	5	II. Body Parts—face
8	87.32	2	I. Body Planes—relation of external horizontal-vertical surfaces
9	84.40	11	IV. Laterality—simple directions
10	84.14	7	II. Body Parts—hands, fingers
11	81.02	12	IV. Laterality—object/relation
12	78.24	15	V. Directionality—left and right object
13	73.20	13	IV. Laterality—complex directions
14	58.68	6	II. Body Parts—complex (limb parts)
15	52.56	16	V. Directionality—others' movements
16	42.92	14	V. Directionality—other people

Table 21

Mean Percent of Ages

Section	*Percent*
I. Planes	92.36
II. Body Parts (excluding no. 6 Complex Limb Parts = 89.63%)	81.89
III. Body Movements	94.47
IV. Laterality	78.54
V. Directionality	57.90
Total Battery	81.28

Appendix B

SURVEY FORM

BODY IMAGE OF BLIND CHILDREN

Screening Test

I. Body Planes

1. Identification of Body Planes (Child Standing)
   - a. Touch the top of your head.
   - b. Touch the bottom of your foot.
   - c. Touch the side of your body.
   - d. Touch the front of your body (or "stomach").
   - e. Touch your back.

2. Body Planes in Relation to External, Horizontal, and Vertical Surfaces
   (Child is lying/standing on a mat.)
   - a. Lie down on the mat so that the side of your body is touching the mat.
   - b. Now move so that your stomach or the front of your body is touching the mat.
   - c. Now move so that your back is touching the mat.
   - d. Here touch the wall with your hand, now move so that your side is touching the wall.
   - e. Here touch the wall with your hand, now move so that your back is touching the wall.

3. Objects in Relation to Body Planes
   (Child is seated in a chair with a box.)
   - a. Place the box so that it touches your side.
   - b. Place the box so that it touches your front (or your stomach)
   - c. Place the box so that it touches your back.
   - d. Place the box so that it touches the top of your head.
   - e. Place the box so that it touches the bottom of your foot.

II. Body Parts

4. Body Part Identification: Simple
   (Child is seated in a chair.)
   - a. Touch your arm.
   - b. Touch your hand.
   - c. Touch your leg.
   - d. Touch your elbow.
   - e. Touch your knee.

5. Parts of the Face
   (Child is seated in a chair.)
   - a. Touch your ear.
   - b. Touch your nose.

c. Touch your mouth.
d. Touch your eye.
e. Touch your cheek.

6. Parts of the Body: Complex (Limb Parts)
(Child is seated in a chair.)
a. Touch your wrist.
b. Touch your thigh.
c. Touch your forearm
d. Touch your upper arm.
e. Touch your shoulder.

7. Parts of the Body (Hands-Fingers)
(Child is seated in a chair.)
a. "Hold up" your thumb.
b. "Hold up" your (first) pointer finger.
c. "Hold up" your little (pinkie) finger.
d. "Hold up" your big (middle) finger.
e. "Hold up" your ring finger.

III. Body Movements

8. Movements of the Body: Trunk Movement While Fixed
(Child is standing.)
a. Bend your body slowly backwards (or "away") from me . . . stop.
b. Bend your body slowly forward (or toward the front) toward me . . . stop.
c. Bend your body slowly to the side . . . stop.
d. Bend your knees and slowly squat down . . . stop.
e. Rise upon your toes . . . stop.

9. Gross Movements in Relation to Body Planes
(Child is standing.)
a. Walk forward toward me . . . stop.
b. Walk backward away from me . . . stop.
c. Jump up . . . stop.
d. Move your body to the side by stepping sideways . . . stop.
e. Move sideways to the other side . . . stop.

10. Limb Movements
(Child is standing/lying on a mat.)
While standing:
a. Bend one arm at the elbow.
b. Lift one arm high in the air.
While in a back-lying position:
c. Bend one knee.
d. Bend one arm.
e. Straighten your arm.

IV. Laterality

11. Laterality of Body: Simple Directions
(Child is seated in a chair.)
a. Touch your right knee.

b. Touch your left arm. ________
c. Touch your right leg. ________
d. Bend over slowly and touch your left foot. ________
e. Touch your left ear. ________

12. 12. Laterality in Relation to Objects
(Child is seated in a chair with a box.)
a. Place the box so that it touches your right side. ________
b. Place the box so that it touches your right knee. ________
c. Hold the box in your left hand. ________
d. Bend down slowly and place the box so that it touches your right foot. ________
e. Hold the box in your right hand. ________

13. Laterality of Body: Complex Directions
(Child is seated in a chair.)
a. With your left hand touch your right hand. ________
b. With your right hand touch your left knee. ________
c. With your left hand touch your right ear. ________
d. With your right hand touch your left elbow. ________
e. With your left hand touch your right wrist. ________

V. Directionality

14. Directionality in Other People
(Child is standing.)
Tester is seated facing child. The child's hands are placed on the tester's body parts.
a. Tap my left shoulder. ________
b. Tap my left hand. ________
c. Tap my right side. ________
d. Tap my right ear. ________
e. Tap the left side of my neck. ________

15. The Left and Right of Objects
(Child is seated in a chair with a box.)
a. Touch the right side of the box. ________
b. Touch the left side of the box. ________
c. With your left hand touch the right side of the box. ________
d. With your right hand touch the left side of the box. ________
e. With your left hand touch the left side of the box. ________

16. Laterality of Others' Movements
(Child is standing.)
a. (Tester is seated with the child. The child's hands are placed on the tester's shoulder.)
Am I bending to my right or left? (Bend right.) ________
b. (Tester is seated with the child. Child's hands are placed on the tester's shoulder.) ________
Am I bending to the right or left? (Bend left.) ________
c. (Tester is seated with his back to the child. The child's hands are placed on the tester's shoulder.) ________
Am I bending to my right or left? (Bend left.) ________

d. (Tester is seated with his back to the child. Child's hands are placed on the tester's shoulder.)
Am I bending to my right or left? (Bend right.) ____________
____

e. (Tester is standing with his front to child. Child stands still.) ____________
Am I moving to my right or left? (Moves left.) ____________